U.S. Government

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(Formerly U.S. Government Research Reports)

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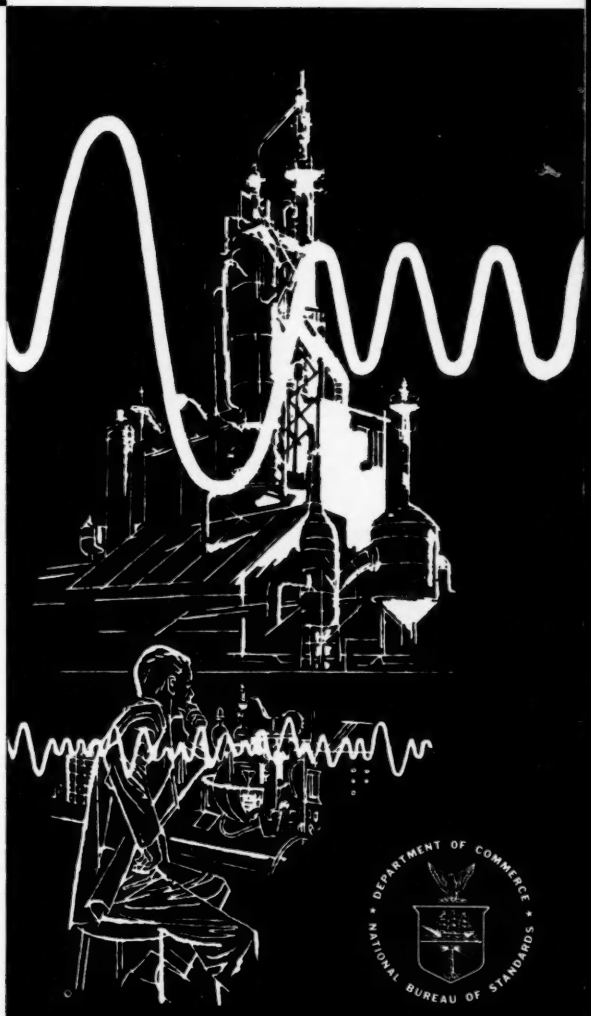

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U.S. DEPARTMENT OF COMMERCE
Clearinghouse
For Federal Scientific and Technical Information
(Formerly Office of Technical Services)

U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

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PURPOSE

U.S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS (formerly U.S. Government Research Reports) is published by the Clearinghouse for Federal Scientific and Technical Information to announce the availability to the public of new reports of U.S. Government-sponsored research and development released by the Department of Defense and other Federal agencies. The Atomic Energy Commission and the National Aeronautics and Space Administration issue their own announcement journals as noted below.

FORMAT

USGRDR contains two sections with a combined table of contents. The first section, "Technical Abstract Bulletin" (TAB), announces reports released by the Defense Documentation Center (DDC) of the Department of Defense. The second section, "Other Research Reports and Related Material," announces reports released by civilian agencies and also includes certain older military reports. Reports are listed by report/accession number under 33 subject division headings. Both sections contain abstracts and complete bibliographic citations and are followed by their respective indexes.

HOW TO USE

Readers are urged to review all abstracts in their fields of interest, noting report/accession numbers and titles of reports to be ordered. Although primarily for retrieval, the descriptors provide a quick grasp of a report's scope. The reader is reminded that reports applicable to his field may be found under various subject divisions; the various indexes will aid in locating those reports. Cumulative indexes are published periodically.

TO ORDER REPORTS

Order reports by report/accession number (as given on the first line of each entry) and title from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche copy (MF) are given for each entry. Prepayment is required unless purchases are to be charged to Superintendent of Documents deposit account. Order forms will be found in the back. Make check or money order payable to National Bureau of Standards—CFSTI.

OTHER JOURNALS

Reports of the National Aeronautics and Space Administration and the Atomic Energy Commission can be ordered from the Clearinghouse. Reports available are listed in the following journals open to public subscription from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NUCLEAR SCIENCE ABSTRACTS, Atomic Energy Commission, $30 a year domestic, $37 foreign, $1.75 single copy plus 25 percent foreign mailing.

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. National Aeronautics and Space Administration, $25 a year domestic, $31 foreign, $1.50 single copy plus 25 cents foreign mailing.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Bernard M. Fry, *Director*

Contents may be reprinted freely. Mention of source will be appreciated. Use of funds for this publication approved by the Director of the Bureau of Budget, June 30, 1961.

special ANNOUNCEMENTS

GOVERNMENT-WIDE INDEX

A comprehensive, unified index to Government research and development reports -- resulting from machine merger of input from the major Federal agencies -- will be published monthly by the Clearinghouse beginning in March 1965.

This consolidated index to Government-sponsored technical literature--the Government-Wide Index to Federal Research and Development Reports--will provide scientists, engineers, and research managers with a single source index to new unclassified/unlimited Government technical information.

The Government-Wide Index will consist of the standard points of access to report literature--subject, author, source, and report number indexes.

For this project the Clearinghouse is using the computer facilities of the Aerospace Research Applications Center located at the University of Indiana. The Index will be made up from the machinable document records prepared by the Atomic Energy Commission, National Aeronautics and Space Administration, Department of Defense, and the Clearinghouse for their own document announcement journals, avoiding duplication of data preparation.

Each of these agencies is now sending ARAC its machine records which ARAC reformats by computer into the index format specified by the Clearinghouse. The magnetic tape produced from this operation contains one record of the input from all contributing agencies.

This information is then sorted into sequence for each of the four indexes. Camera-ready copy for the publication is produced by computer printout. This copy will be proof-read and the Index pages made up at the Clearinghouse. The Index will be printed and distributed by the Superintendent of Documents, U. S. Government Printing Office.

When issued about the middle of each month, the Government-Wide Index will include material from the previous month's issues of Nuclear Science Abstracts (AEC), Scientific and Technical Aerospace Reports (NASA), Technical Abstract Bulletin (Defense Documentation Center), and the U. S. Government Research and Development Reports (Clearinghouse).

The first issue of the Index will cover technical reports of these agencies from January 1, 1965.

The Government-Wide Index to Federal Research and Development Reports is priced at $10 for a one year subscription (12 issues). Add $2.50 for foreign mailing. Single issues will be available at $1.25 per copy. Order subscriptions now from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Make remittances payable to the Superintendent of Documents.

INDEXES ADDED TO "OTHER REPORTS" SECTION

In order to parallel the indexing system of the "Technical Abstract Bulletin" section of USGRDR, two new indexes--Personal Author and Contract Number--have been added to the "Other Research Reports" section. The addition brings to five the number of indexes now provided for this section. They are Subject, Personal Author, Corporate Source, Contract Number, and Accession/Report Number.

R&D TO BE HIGHLIGHTED FOR INDUSTRY

Beginning in the March 5 issue of USGRDR, research and development reports of particular interest to industry will be featured near the front of this journal under the heading, "Highlights Of This Issue."

The reports will be selected by a team of technical evaluators at the National Bureau of Standards as being in one of the 49 categories of current high industrial interest.

The complete announcement and bibliographic citations of the reports will also appear in their appropriate divisions in the text.

The "Highlights" serves one of the primary aims of the Clearinghouse. It follows through on the main task of making vast amounts of Government-sponsored research available to industry by pinpointing the information for specific areas of interest.

Each report in "Highlights" will be summarized briefly and placed under its appropriate industrial category heading.

The 49 categories to be covered--although not in each issue--are as follows:

Acoustics
Adhesives, Sealers
Automation
Biological and Medical Sciences
Bonding/Joining
Ceramics, Refractory Materials (Non-Metallic)
Chemical Processing
Chemicals
Cleaning and Finishing
Coatings
Communications
Composite, Mixed Materials
Control Systems and Instrumentation
Data Processing
Electrical
Electronic
Engineering and Construction
Fibers and Textiles
Food Processing
Fuels
Heating, Ventilating, Air-Conditioning and Plumbing
Human Factors Engineering
Information Technology
Low-Temperature Materials and Processes
Lubricants
Machine Tools and Tooling
Maintenance Techniques
Management Control, Decision Systems
Materials Handling
Mechanical Equipment
Metals, Ferrous and Alloys
Metals, Non-Ferrous and Alloys
Metalworking and Metal Forming
Nuclear Technology
Optics
Packaging and Containerization
Plasma Technology
Plastics
Power Source Devices
Printing, Graphic Arts Photography
Quality Control Standards, Specifications
Rubber
Safety Engineering
Sanitary Engineering
Semiconductors and Related Materials
Space Technology
Testing, Analysis
Transportation (Land, Sea, Air, Space)
Wood and Paper

CONTENTS

Page No.

Section I TECHNICAL ABSTRACT BULLETIN 1-116

Section II OTHER RESEARCH REPORTS AND RELATED MATERIAL S-1 - S-39

Subject Divisions

1 Aircraft and Flight Equipment 1, S-1
2 Astronomy, Geophysics, and Geography 3, S-1
3 Chemical Warfare Equipment and Materials 12, S-2
4 Chemistry 14, S-2
5 Communications 18, S-4
6 Detection 19, S-4
7 Electrical Equipment 22, S-6
8 Electronics and Electronic Equipment 23, S-7
9 Fluid Mechanics 38, S-11
10 Fuels and Combustion 44, S-12
11 Ground Transportation Equipment 47
12 Guided Missiles 48, S-13
13 Installations and Construction 52, S-15
14 Materials (Non-Metallic) 53, S-15
15 Mathematics 57, S-17
16 Medical Sciences 61, S-18
17 Metallurgy 64, S-19
18 Military Sciences and Operations 69
19 Navigation 72
20 Nuclear Physics and Nuclear Chemistry 73, S-19
21 Nuclear Propulsion . . . . . No Entries
22 Ordnance 75, S-23
23 Personnel and Training 77
24 Photography and Other Reproduction Processes 79, S-25
25 Physics 80, S-25
26 Production and Management 92, S-25
27 Propulsion Systems 95, S-27
28 Psychology and Human Engineering 98, S-27
29 Quartermaster Equipment and Supplies 102, S-27
30 Research and Research Equipment 103, S-28
31 Ships and Marine Equipment 110, S-32
32 Miscellaneous Arts and Sciences 112, S-32
33 Transportation 116, S-39

Subject Index A-1, S-41
Personal Author Index B-1, S-43
Corporate Author-Monitoring Agency Index C-1
Corporate Source Index S-45
Contract Index D-1, S-47
AD - Division Index E-1
Accession/Report Number Index S-49

TECHNICAL ABSTRACT BULLETIN

1. Aircraft and Flight Equipment

AD-609 489 Div. 1
OTS Prices: HC $3.00/MF $0.75

Air Force Aerospace Research Pilot School, Edwards AFB, Calif.
PERFORMANCE FLIGHT TESTING THEORY,
by George D. Hendrix, Orgle D. Godwin, Frank D. Frazier, and Rodney E. Durnin. 1964, 93p
FTC-TIH-64-2005

Unclassified report

Descriptors: (*Flight testing, Theory), Flight instruments, Landing, Take off, Fuel consumption, Fuel meters, Aerodynamic characteristics, Drag, Thrust, Climbing, Acceleration, Atmosphere, Performance (Engineering).

Contents:
The atmosphere
Instrumentation
Pitot-static system theory
Non-steady state performance
Turning performance
Steady state performance
Fuel flow corrections
Takeoff and landing theory.

AD-609 553 Div. 1
OTS Prices: HC $4.00/MF $1.25

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
ADVANCED FLIGHT CONTROL SYSTEM CONCEPTS FOR VTOL AIRCRAFT.
Technical rept., Phase 1.
Oct 64, 203p R-428
Contract DA44 177TC757, Proj. DSR54 190, Task 1D121401A14224
TRECOM TR64 50

Unclassified report

Descriptors: (*Flight control systems, Vertical take-off planes), (*Vertical take-off planes, Flight control systems), Attitude control systems, Stability, Optimization, Control Aerodynamic characteristics, Velocity, Motion, Acceleration, Feedback, Design, Theory, Flight paths, Mathematical analysis, Equations.

The report describes the results from Phase I of a research program to develop practical control systems providing optimum control characteristics for VTOL aircraft under all conditions. Control system requirements are developed from an analysis of the VTOL flight control problem. Possible advanced system concepts are described and the evaluation of these concepts using a fixed base flight simulator is reported. The results indicate the desirability of controlling ground velocity during hovering and low speed flight, and aircraft attitude during cruise flight. The analytical design of a self-contained inertial velocity measuring system to provide the required indication of ground velocity is presented. The design of an experimental flight control system for a tandem rotor helicopter is described in detail and a flight test program to evaluate the control system concepts using the experimental equipment outlined. (Author)

AD-609 615 Div. 1
OTS Prices: HC $4.00/MF $1.00

General Dynamics/Convair, San Diego, Calif.
STRUCTURAL DESIGN FOR FUEL CONTAINMENT UNDER SURVIVABLE CRASH CONDITIONS.
Final technical rept.,
by P. M. Nissley and T. L. Heid. Aug 64, 138p
GDC-64-222
Contract FA-WA4607
FAA ADS19

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aircraft fires, Fire safety), (*Fire safety, Aircraft fires), (*Fuel tanks, Aviation safety), (*Aviation safety, Fuel tanks), Aircraft, Fuel systems, Tanks (Containers), Toughness, Impact shock, Aviation accidents, Drop testing, Structural properties, Aircraft equipment, Feasibility studies, Survival, Aeronautics.

This study is an investigation of crash-resistant design principles for integral fuel tanks. The objective was to improve fuel containment as a means of minimizing or eliminating post-crash fires during severe but survivable accidents. Aircraft types studied were multi-engine transports. Analytical studies indicate relative strengths, weights and costs for various tank configurations subjected to concentrated impact, distributed impact and fuel inertial loadings. Results of full-scale tank tests substantiate analytic results. (Author)

AD-609 762 Div. 1, 30
OTS Prices: HC $1.00/MF $0.50

Hughes Aircraft Co., Culver City, Calif.
JANAIR: JOINT ARMY-NAVY AIRCRAFT INSTRUMENTATION RESEARCH. ANALYSIS OF PICTORIAL DISPLAYS,
Quarterly progress rept. no. 2,
by W. L. Carel. Dec 64, 8p HAC-2732.01/23
Contract Nonr446800

Unclassified report

Descriptors: (*Flight instruments, Display systems), (*Display systems, Flight instruments), (*Instrument panels, Display systems), Performance (Human), Pilots, Mission profiles, Target recognition, Television display systems, Flight paths, Human engineering, Armed forces research.

During the past quarter, the work has centered around four main topics: (1) The conception of the pilot's job as a set of hierarchal tasks. (2) The development of a model for target recognition in literal pictorial displays. (3) The development of a graded series of landing and low level flight hypothetical pictorial displays. (4) The generation of data to fill in the cells on the chart described in the first quarterly report (AD-606 705). None of these tasks has been completed, so a full discussion will be deferred until the time they are sufficiently developed to warrant substantive treatment. Because the topics are not completely developed, progress will be described only in broad outline.

AD-609 781 Div. 1
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
LONGITUDINAL STABILITY OF AN AIRPLANE WITH DELAYED ACTION AUTOPILOT,
by V. S. Kislyakov. 3 Dec 64, 13p
FTD TT64 335; TT 65 60581

Unclassified report

Unedited rough draft trans. of mono. Avtomaticheskoe Regulirovanie i Upravlenie, Moscow, 1962, p. 115-123.

Descriptors: (*Airplanes, Stability), (*Automatic pilots, Airplanes), Series, Differential equations, Equations, Pitch (Motion), Oscillation, Aerodynamic characteristics, USSR.

An investigation was made with the aid of asymptotic methods by Krylov and Bogolyubov of longitudinal stability of an aircraft with an autopilot which is making short-period movements. The presence of delay in the autopilot has a substantial effect on the stability of the airplane. This effect is expressed in the first place in considerable narrowind down of the area of stability of the system constructed in the plane for the transmittable numbers of the autopilot. Not to take into account the delay may lead to the choice of designs of autopilot outside the area of the asymptotic stability of the system, i.e., to instability. The permissible value for the delay in the autopilot depends on and is determined by the value of the aerodynamic coefficients. With a given value of delay the aerodynamic coefficients determined the permissible adjusting of the autopilot. The periodic oscillations occurring (natural oscillations) which are set up on the boundary of the area of the asymptotic stability of the system under consideration are stable for small values, i.e., according to Bautin the boundary is safe for small magnitudes. (Author)

2. Astronomy, Geophysics and Geography

AD-609 452 Div. 2, 9
OTS Prices: HC $11.65/MF $3.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
GASDYNAMICS OF ENGINES,
by A. I. Borisenko. 12 Oct 64, 864p
FTD TT63 852; TT 65 60474

Unclassified report

Unedited rough draft trans. of mono. Gazovaya Dinamika Dvigatelei, Moscow, 1962, 793p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fluid mechanics, Aircraft engines), (*Aircraft engines, Fluid mechanics), Textbooks, Theory, Mathematical analysis, Mathematical models, One-dimensional flow, Linear systems, Boundary layers, Fluid flow, Magnetohydrodynamics, Turbojet engines, Design, Turbojet inlets, Turbojet exhaust nozzles, Liquids, Cavilation, Atomization, Sprays, Gases, Dynamics.

The book deals with the basic problems of the gasdynamics of aircraft engines, particularly gas turbines. The statements are preceded by a derivation and analysis of the equations of the mechanics of continuous media. One-dimensional and linearized plane flows are considered in detail. A theory is given of the isolated profile and the profile skeleton. Fundamental information on boundary layers is given; the theory of a wing of finite span is presented in brief. The inlet arrangements of a jet, the nozzles, are considered in detail. The physics of cavitation and spraying of liquids, the fundamentals of the mechanics of highly rarefied gases, and the elements of magneto-gasdynamics are discussed. The book has been written for students at aviation colleges and faculties, students at power engineering faculties of institutes of machine building, and workers in design offices and turbine-building laboratories. (Author)

AD-609 454 Div. 2, 30
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
ROCKET MEASUREMENTS WITH ELECTRON AND ION PROBES IN AN AURORA.
Environmental research paper,
by J. C. Ulwick, W. Pfister, O. C. Haycock, and K. D. Baker. Sep 64, 32p
AFCRL 64 791; AFCRL ERP56

Unclassified report

Descriptors: (*Sounding rockets, Atmospheric sounding), (*Aurorae, Atmospheric sounding), (*Atmospheric sounding, Aurorae), Electrons, Ions, Standing wave indicators, Plasma medium, Cameras, Photometers, Spectrum analyzers, Magnetometers, Electrostatics, Electron density, Telemeter systems, Performance (Engineering).

An Aerobee rocket was fired into Class I Aurora at Churchill, Canada on 8 February 1964. Data are available from the following experiments: retarding potential probes mounted on the front and side, standing wave impedance probe on two frequencies, plasma frequency probe, plasma resonance probe, and a Langmuir probe. In addition, simultaneous measurements have been made with ionosondes, all sky cameras, photometers, spectrometers, auroral radar, riometers, and magnetometers. The rocket went through the aurora on ascent and descent at about 105 km. Density values were measured at this altitude about 2.5 x 100,000 per cu cm. This is about a factor of 10 more than that measured at the peak altitude of 228 km. The data are relatively smooth with little of the irregularities expected in an aurora. (Author)

AD-609 455 Div. 2
OTS Prices: HC $3.00/MF $0.75

Institute of Geodesy, Photogrammetry and Cartography, Ohio State Univ. Research Foundation, Columbus.
THE BOUNDARY VALUE PROBLEM OF PHYSICAL GEODESY.
Scientific rept. no. 12,
by Helmut Moritz. Aug 64, 73p IGPC-46
Contract AF19 628 2771, Projs. 7600, 1613, Task 760002
AFCRL 64 833

Unclassified report

Descriptors: (*Geodesics, Boundary value problems), (*Boundary value problems, Geodesics), Earth, Configuration, Determination, Integral equations, Gravity, Reduction, Isostatic change, Geophysics, Numerical methods and procedures.

This report compares the existing methods for solving the geodetic boundary value problem, i.e., the gravimetric determination of the geoid (traditional methods) or the physical surface of the earth (modern methods). A unified treatment is attempted by deducing all these methods from one very general integral equation. Gravity reduction is discussed from the traditional and the modern point of view. The different kinds of free-air anomalies and free-air reductions, which are a controversial subject, are compared. Emphasis lies on the general aspects of the methods discussed. (Author)

AD-609 490 Div. 2
OTS Prices: HC $1.00/MF $0.50

Marine Physical Lab., Univ. of California, San Diego.
MANIPULATORS AND SPECIAL DEVICES,
by Victor C. Anderson and H. A. O'Neal. 31 Jul 64, 17p MPL-U-50/64, SIO-Ref-64-16
Contract Nonr221605

Unclassified report

Rept. on Proj. SEABED.

Descriptors: (*Oceanographic equipment, Underwater equipment), (*Positioning devices (Machinery), Underwater equipment), Sonar, Underwater lights, Underwater object locators, Small tools, Underwater cutting, Hydraulic systems, Television communication systems, Underwater, Test facilities, Hydraulic pressure pumps, Sea water.

The important factors involved in the performance of work in the deep ocean are discussed, and the requirements for special devices which may be used to enhance the efficiency of this work are outlined. The basic requirements of observations and manipulation point to specific needs for technological developments but do not call for any extensive program of fundamental research. (Author)

AD-609 493 Div. 2, 12
OTS Prices: HC $7.30/MF $2.00

ARACON Geophysics Co., Concord, Mass.

PRACTICAL INTERPRETATION OF METEOROLOGICAL SATELLITE DATA.
Final rept.,
by William K. Widger, Jr., Paul E. Sherr, and C. W. C. Rogers. Sep 64, 427p ARA-9219-12
Contract AF19 628 2471, Proj. 6698, Task 669802
AFCRL 64 807

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Meteorological satellites, Weather forecasting), (*Weather forecasting, Meteorological satellites), Satellites (Artificial), Aerial photography, Cloud cover, Air mass analysis, Tropical cyclones, Infrared scanning, Weather communications, Photographs, Meteorological charts, Analysis, Meteorology.

This report attempts to consolidate within a single document information pertinent to the operational interpretation, as regards weather analysis and forecasting, of meteorological satellite data. Accordingly, it extracts, integrates, and summarizes material available in the literature and in technical reports up through early 1964. The report is written specifically for the use of Air Weather Service field forecasters. Topics considered include the coverage, scale, and resolution of the satellite data, operationally available data formats, coordination with other meteorological data, cloud type interpretation, key features observed in the pictures, extratropical vortex interpretations, other synoptic and mesoscale features, interpretations of tropical data, and contributions of the satellite data to weather forecasting. Procedures for the integration of satellite and conventional data and analyses, and for the use of satellite data to provide improved synoptic analyses, are developed and presented. Guidance as regards the operational interpretation, application, and value of infrared data for atmospheric windows is provided, looking toward the time when such data are made available to the field forecaster. (Author)

AD-609 525 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

United ElectroDynamics, Inc., Pasadena, Calif.
EVALUATION TESTS, NATIONAL GEOPHYSICAL COMPANY SEISMOMETER TYPE 21.
Special rept. no. 21.
13 Oct 64, 22p
Contract AF33 657 7747, Proj. VELA T070S AMC

Unclassified report

Descriptors: (*Seismographs, Performance (Engineering)), Seismology, Instrumentation, Specifications, Test methods, Tests, Experimental data, Graphics.

This report describes the results of the evaluation tests. A table summarizing the results obtained from the tests is presented. Measured or computed values of the various parameters are compared with the manufacturer's specifications and with equivalent values for the Johnson-Matheson seismometer. The manufacturer's specifications on damping and natural frequency were confirmed by the test. Mass, weight and the maximum travel were not measured. In general, the J-M and National-21 systems are similar. However, thunderstorm activity caused much larger signals on the National-21 than on the J-M system. The magnification of the National-21 system is approximately 40% of that of an equivalent J-M system when used as a current sensitive device feeding a low impedance amplifier. If used as a voltage-sensitive device feeding a high impedance amplifier, the magnification of the National-21 is approximately 65% higher than that of the J-M. (Author)

AD-609 528 Div. 2, 30, 32
OTS Prices: HC $2.00/MF $0.50

Texas Instruments, Inc., Dallas.
AUTOMATED BULLETIN AND SEISMIC DATA RETRIEVAL SYSTEM.
Status rept.,
by H. M. Rackets. 1 Nov 63, 31p
Contract AF33 600 43486, Proj. VT1124,
ARPA Order 104 60

Unclassified report

Descriptors: (*Seismology, Information retrieval), (*Information retrieval, Seismology), (*Data processing systems, Seismology), Geophysics, Computers, Programming languages, Programming (Computers), Periodicals, Automation.

The Automated Bulletin Program is a system of programs which can be run in sequence on a 'system' oriented computer with a minimum of magnetic tape changes. The system was oriented to obtain a maximum of valid information for research as well as to efficiently provide a seismic bulletin. The concept of operations consists of first picking the arrivals and then checking them against predicted arrivals generated by the computer from USC and GS hypocenter information and travel time curves. Manual bulletins are frequently prepared only after USC and GS information is available to assist in picking arrivals. This latter procedure provides a more complete bulletin, particularly when data analysts are not highly experienced, but introduces a weighting in favor of existing travel time curves. If re-analysis of film strips with aid of PDE data is not performed, scatter in picked arrival times will increase, but should be more closely centered about the actual arrival times. The automated bulletin system will identify phases and collate events analyzed with PDE data more economically than can be done manually, but by operating on raw station data still greater economy can be affected.

AD-609 530 Div. 2, 30
OTS Prices: HC $2.00/MF $0.50

United ElectroDynamics, Inc., Pasadena, Calif.
STUDY OF AUTOMATIC CALIBRATION OF SEISMOGRAPH SYSTEMS.
Special rept. no. 17,
by G. F. Francis. 15 Sep 64, 30p
Contract AF33 657 7747, Proj. VELA T 070 S AMC

Unclassified report

See also AD-609 532.

Descriptors: (*Seismographs, Calibration), Automatic, Test equipment (Electronics), Frequency analyzers, Phase shift, Measurement, Specifications, Reviews, Instrumentation, Seismology.

AD-609 531 Div. 2
OTS Prices: HC $1.00/MF $0.50

United ElectroDynamics, Inc., Pasadena, Calif.
EVALUATION OF B AND D SUMMATION TRACES AT THE TONTO FOREST SEISMOLOGICAL OBSERVATORY.
Special rept. no. 13,
by R. W. Davis. 3 Aug 64, 8p
Contract AF33 657 7747, Proj. VELA T070

Unclassified report

See also AD-609 538.

Descriptors: (*Seismology, Recording systems), Seismic waves, Earthquakes, Signal-to-noise ratio, Graphics, Analysis, Seismological stations, Seismographs, Effectiveness.

This is an interim report on a project to compare quality of signal reception on Summations B, B sub 1, and B sub 2 with quality of signal reception on Summations D, D sub 1 and D sub 2 respectively. Data from a recording period of two full months were analyzed. These results are summarized as follows: (a) Summations B and B sub 1 appear to be nearly identical in quality of signal reception to Summations D and D sub 1 at the gains used. (b) Summation D sub 2 has a more prominent high frequency background than Summation B sub 2. This reduces its reception quality very slightly on low level events. (c) The increase in high frequency background due to increased gains on Sums B sub 1 and D sub 1, and particularly on Sums B sub 2 and D sub 2 decreases the probability of 'ip' starts. This is to be expected from past analytic experience. (Author)

AD-609 532 Div. 2
OTS Prices: HC $1.00/MF $0.50

United ElectroDynamics, Inc., Pasadena, Calif.
INVESTIGATION OF SYSTEM RESPONSE AS A FUNCTION OF AZIMUTH FROM TONTO FOREST SEISMOLOGICAL OBSERVATORY.
Special rept. no. 15,
by V. W. Taylor. 14 Aug 64, 14p
Contract AF33 657 7747, Proj. VELA T 070
Unclassified report

See also AD-609 533.

Descriptors: (*Seismology, Recording systems), Seismic waves, Earthquakes, Underground explosions, Detection, Signal-to-noise ratio, Graphics, Analysis, Seismological stations, Azimuth, Seismographs, Effectiveness.

This report covers the progress made in correlating P-wave signal amplitudes with azimuth to the source and local seismometer site geology. Signals from both teleseismic and explosive sources were used for the study.

AD-609 533 Div. 2
OTS Prices: HC $1.00/MF $0.50

United ElectroDynamics, Inc., Pasadena, Calif.
EVALUATION OF THE MULTIPLE ARRAY PROCESSOR IN DETECTING P-WAVE MOTION AT THE T.F.S.O.
Special rept. no. 14,
by E. W. Moore. 4 Aug 64, 13p
Contract AF33 657 7747, Proj. VELA T070
Unclassified report

See also AD-609 531.

Descriptors: (*Seismology, Instrumentation), Seismic waves, Seismographs, Monitors, Recording systems, High frequency, Noise, Phase shift, Signal-to-noise ratio, Seismological stations.

The MIP detected a lower number of arrivals than Sum B sub 2, probably because it enhances high frequency noise at any single seismometer and because of its lower response to signals with periods greater than 1.0 seconds. The wave form of a seismic signal is changed to some extent by MIP, but direction of first motion appears to be the same as for Z-1 and Sum B sub 2. This may be caused by background noise on one or more seismometers. Examination of the records indicates that MIP, used with individual seismometers and/or a high gain filtered summation trace, is quite useful as an analysis aid, but possibly due to phase shift, or period of the first P arrival, the time delay appears to vary from 0.8 to 1.2 seconds, so timing of events is not being done from this trace. Visual evaluation of signal-to-noise ratios on MIP, Z-1, Sum B sub 1 and Sum B sub 2 shows there is generally an enhancement of signal-to-noise ratio by MIP relative to Z-1, Sum B sub 1 and Sum B sub 2, but high frequency noise on a single seismometer causes much more noise on MIP than on Sums B sub 1 and B sub 2.

AD-609 536 Div. 2
OTS Prices: HC $1.00/MF $0.50

United ElectroDynamics, Inc., Pasadena, Calif.
EFFECT OF CHANGING MULTIPLE ARRAY PROCESSOR OUTPUT FILTER BAND WIDTH.
Special rept. no. 18,
by E. W. Moore. 8 Sep 64, 5p
Contract AF33 657 7747, Proj. VELA T 070 S AMC
Unclassified report

Prepared by Tonto Forest Seismological Observatory, Payson, Ariz.
See also AD-609 530.

Descriptors: (*Seismology, Instrumentation), (*Noise, Seismological stations), Bandwidth, Frequency, Calibration, Filters (Electromagnetic wave).

The MAP summation at the TFSO is particularly affected by noise in the frequencies generated by wind, thunder, and animals or personnel near a seismometer site. In an attempt to decrease this effect, the MAP output filter was changed from a bandwidth of 5.0 - 0.75 cps with 12db per octave slopes to a bandwidth of 3.0 - 0.75 cps, with 24db per octave slope at 3 cps, and a 12db per octave slope at 0.75 cps. Frequency response was obtained by driving all the involved seismometer calibration coils simultaneously. The change in filter characteristics appears to have improved the quality of the MAP trace by eliminating or reducing most of the higher frequency noise. 'Before and after' sequences are shown.

AD-609 537 Div. 2
OTS Prices: HC $1.00/MF $0.50

United ElectroDynamics, Inc., Pasadena, Calif.
EFFECTS OF THUNDERSTORMS ON TFSO OPERATIONS, 1964.
Special rept. no. 23,
by H. W. Russell. 20 Nov 64, 13p
Contract AF33 657 7747, Proj. VELA T 070 S AMC
Unclassified report
Prepared by Tonto Forest Seismological Observatory, Payson, Ariz. See also AD-609 536.

Descriptors: (*Thunderstorms, Damage), (*Seismology, Thunderstorms), Vulnerability, Seismographs, Lightning, Acoustics, Data, Seismological stations, Instrumentation.

During the period from 24 June to 14 September 1964, there were thirteen thunderstorms which caused damage to TFSO instrumentation. All but four of the eighty-eight seismograph systems were damaged by from one to eight of the storms. The extent of the damage per storm ranged from 2% to 56% of the seismometer circuits. With a few exceptions which are noted below, damage was confined to the lightning protection devices, i.e., fuses and carbon block spark gaps. Damage is tabulated.

AD-609 538 Div. 2
OTS Prices: HC $1.00/MF $0.50

United ElectroDynamics, Inc., Pasadena, Calif.

TONTO FOREST SEISMOLOGICAL OBSERVATORY.
LINEAR ARRAY PROGRESS.
Special rept. no. 5, 25 May-31 Jul 62,
by George F. Francis. 31 Jul 62, 12p
Contract AF33 657 7747, Proj. VT/070
Unclassified report

Prepared by Tonto Forest Seismological Observatory, Payson, Ariz.

Descriptors: (*Seismology, Instrumentation), Linear systems, Seismographs, Electronic recording systems, Installation, Site selection, Seismological stations.

This is the initial progress report on installation of a two-directional 21-element crossed linear array, one line oriented NW-SE, pointed in the direction of the Nevada Test Site. Work was begun immediately on design and preparations for installing the array and expanding the electronic circuits in the TFSO trailer to be used as a temporary recording station. Recording of five seismometers on a Develocorder was started on 13 July. By the end of July, all eleven seismometers on the NW-SE line were being recorded on the Develocorder and most of those on the cross line were installed and calibrated. Two tape recorders were received and are being installed.

AD-609 547 Div. 2
OTS Prices: HC $1.00/MF $0.50

Lowell Observatory, Flagstaff, Ariz.
PHYSICAL RESEARCHES ON THE BRIGHTER PLANETS.
Final rept. for 15 Jun 59-31 Aug 64,
by William M. Sinton. 30 Sep 64, 20p
Contract AF19 604 5874, Proj. 8602, Task 860201
AFCRL 64 926
Unclassified report

Descriptors: (*Planets, Brightness), Scientific research, Astronomical data, Moon, Dust, Photography, Photometers, Radiometers, Infrared research, Temperature, Infrared spectroscopy.

Observational studies of the planets and the moon through the use of photography, photoelectric photometry, infrared radiometry, and infrared spectroscopy have been made and published under this contract. This report cites the salient conclusions of the publications made under the contract. In addition the observational data which has previously not been published is presented in this report. The data given include the measurements of the thickness of dust on the floors of 16 lunar craters; infrared radiometric temperatures of Mercury, Venus, Mars, Jupiter, Saturn, and Uranus, and extensive photoelectric photometry of Mars.

AD-609 555 Div. 2, 13, 20
OTS Prices: HC $7.00/MF $1.75

Stanford Research Inst., Menlo Park, Calif.
STRESS PROPAGATION IN SOILS.
Final rept., pt. 4, Jun 63-Jun 64,
by L. Seaman and R. V. Whitman. Jun 64, 309p
Contract DA49 146XZ018, Proj. PHU2917
DASA 1266 4
Unclassified report

See also AD-410 406.

Descriptors: (*Soils, Stresses), (*Soil mechanics, Model theory), (*Stresses, Propagation), Model tests, Mechanical properties, Shock waves, Sand, Clay, Viscoelasticity, Compressive properties, Mathematical models, Scientific research, Underground structures, Loading (Mechanics), Nuclear explosions.

A knowledge of soil motions resulting from nuclear explosions is necessary for the design of underground structures which are to survive a nuclear attack. In this project the authors studied wave propagation in soil and developed methods for predicting wave propagation phenomena based on data from laboratory compression phenomena based on data from laboratory compression tests on soil samples. The study was restricted to one-dimensional wave propagation in a sand and a clay. Extensive wave propagation tests were made on 5-meter columns of Monterey sand of various densities subjected to transient loads of different intensities and duration. Stresses and particle velocities were measured at various locations in the column to test the validity of theoretical models representing sand. The main feature of stress wave propagation--stress attenuation--can be predicted for sand on the basis of a rate-independent model. In addition, wave front development, wave velocity, particle velocity attenuation, and duration of the stress wave are described qualitatively by this model in combination with a second rate-independent model. The parameters of the models can be determined from static or dynamic compression test data on small samples of sand. (Author)

AD-609 583 Div. 2
OTS Prices: HC $6.00/MF $1.25

Washington Univ., Seattle.
RADIATIVE ENERGY EXCHANGE OVER ARCTIC LAND AND SEA, PART I, DATA, 1962.
Scientific rept.,
by John J. Kelley, Jr., Desmond T. Bailey, and Bruce J. Lieske. Nov 64, 210p
Contract Nonr47724, Proj. NR307 252
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Solar radiation, Arctic regions), (*Arctic regions, Solar radiation), (*Electromagnetic waves, Micrometeorology), Energy, Atmosphere, Transport properties, Measurement, Radiometers, Calibration, Polar regions, Climatology, Meteorology, Data, Tables.

Global short wave, reflected short wave over sea, reflected short wave over land, net total over sea and net total over land radiation were measured continuously at Pt. Barrow, Alaska in 1962. Kipp and Zonen solarimeters were used to measure the short wave radiation and Suomi ventilated radiometers were used to measure the net total radiation. Limitations and errors of these instruments are discussed. Hourly means of radiative flux density (mW minus sq cm) for each component are tabulated by day and month, and the daily energy sums (J minus sq cm) are given. The data are believed to have an accuracy of ±6%. (Author)

AD-609 613 Div. 2, 15
OTS Prices: HC $1.00/MF $0.50

Aerospace Research Center, General Precision, Inc., Little Falls, N. J.
RESEARCH IN THE RESTRICTED PROBLEMS OF THREE AND FOUR BODIES.
Final technical rept.,
by Paul B. Richards, Irwin S. Bernstein, Lawrence H. Russell, and Jane Cronin Scanlon. Nov 64, 7p
Contract AF49 638 1325
AFOSR 64 2492
Unclassified report

Descriptors: (*N-body problem, Hamiltonian), (*Numerical analysis, N-body problem), Celestial mechanics, Perturbation theory, Equations, Motion, Nonlinear differential equations.

The search for mathematical techniques sufficiently powerful to answer the difficult questions regarding stability of solutions of the nonlinear equations of motion in the restricted three-body problem has lead to a detailed investigation of the recent works of Kolmogorov, Arnold and Moser. These significant papers offer new constructive methods in the qualitative analysis of Hamiltonian systems, and relate problems of stability to the existence of periodic and almost periodic motions. For example, Arnold's work on the stability of motion in celestial mechanics resulted in his proof of the existence of almost periodic solutions in the n-body problem of planetary motion. Arnold's techniques enabled Leontovic to establish the stability of the triangular critical points of the planar restricted three-body problem. This theory can now be applied to the restricted problems of three and four bodies in the investigation of stability properties of known periodic motions. Two separate studies have been conducted in the restricted four-body problem. One dealt with the determination of particular solutions of the linearized equations of motion in the neighborhood of the L sub 1 libration point of the restricted three-body problem. The second part of the restricted four-body study has been concerned with the existence of periodic trajectories of the nonlinear equations of motion. The Poincare method of small parameters was successfully used to establish the existence of periodic trajectories in the neighborhoods of the libration points.

AD-609 683 Div. 2
OTS Prices: HC $2.00/MF $0.50

Raytheon Co., Norwood, Mass.
INVESTIGATIONS OF ELECTRICAL CHARACTERISTICS OF THE SUBSURFACE ROCK MEDIUM IN ESSEX COUNTY, NEW YORK.
Scientific rept. no. 5,
by Carson K. H. Tsao. Aug 64, 32p
Contract AF19 628 2362, Proj. 4600, Task 460008
AFCRL 64 731

Unclassified report

Descriptors: (*Electrical conductance, Rock (Geology)), (*Rock (Geology), Electrical conductance), (*Lithosphere, Electrical conductance), Geophysics, New York, Electromagnetic waves, Propagation, Extremely low frequency, Very low frequency, Probes (Electromagnetic), Antennas, Electrical impedance, Signal-to-noise ratio, Geology.

Two vertical drill holes located in Essex County, New York were utilized for measurements to determine the electrical conductivity of the rock media below the surface. Average conductivities in the drill holes were deduced from input impedances of bare monopole antennas placed in the hole. Detailed variations in conductivity with depth in the hole were deduced from short probe measurements. Transmission tests were made between the two drill holes which are separated by a distance of 2.8 miles. In the ELF anf VLF region, transmission of signals were through the rock path between the drill holes. As frequency was increased from the upper region of the VLF band to the mid LF band, the up-over-down mode of propagation became dominant. Where propagation was attributed to the path through the rock, the measured values of mutual impedances between the antennas in the holes were used to deduce the bulk conductivity of the rock path. Measurements of atmospheric noise were also made at one drill hole site to evaluate the refraction loss at the earth-air interface. (Author)

AD-609 684 Div. 2, 8, 25, 30
OTS Prices: HC $2.00/MF $0.50

Raytheon Co., Norwood, Mass.
CONDUCTIVITY MEASUREMENTS IN DISSIPATIVE MEDIA WITH ELECTRICALLY SHORT PROBES.
Scientific rept. no. 6,
by Carson K. H. Tsao. Aug 64, 29p
Contract AF19 628 2362, Proj. 4600, Task 460008
AFCRL 64 848

Unclassified report

See also AD-609 683.

Descriptors: (*Electrical conductance, Probes (Electromagnetic)), (*Probes (Electromagnetic), Dipole antennas), Salts, Water, Solutions, Rock (Geology), Antennas, Electrical properties, Models (Simulations), Geophysics.

In a dissipative medium, the input conductance of either a bare or an insulated short-circuited dipole is simply related to the conductivity of the medium, provided the electrical length of the dipole is short. Model measurements have been made in salt solution of water to demonstrate the feasibility of deducing conductivity of the solution by using both types of antennas as probes. The technique has been utilized to evaluate the electrical conductivity of rock media in deep drill holes. Since rock media are rarely uniform in their electrical characteristics, the deduced conductivity will be a gross average conductivity of that volume of the rock approximately within the antenna region of the probe. (Author)

AD-609 685 Div. 2, 25
OTS Prices: HC $2.00/MF $0.50

Raytheon Co., Norwood, Mass.
VERTICAL ELECTRIC DIPOLE IN A TWO CONDUCTOR REGION.
Scientific rept. no. 4,
by James F. Carolan. Apr 64, 36p
Contract AF19 628 2362, Proj. 4600, Task 460008
AFCRL 64 730

Unclassified report

See also AD-609 684.

Descriptors: (*Electric fields, Earth), Rock (Geology), Electrical conductance, Mathematical models, Geophysics.

The vertical electric fields due to a vertical electric dipole immersed in a dissipative rock medium (dielectric or conductor) situated below a highly conducting overburden (conductor) have been developed. The development is an extension of the work of Banos and Wesley for horizontal electric dipoles, considers the more recent work of Biggs and Paul. Equations are developed to show similarities and differences between the air-conductor and conductor-conductor cases. Expressions are valid in the near-zone region for the conductor-conductor case. For the three-medium case in practice, viz., air above overburden above rock, when the air-overburden presents a small correction to the two-medium conductor-conductor case, expressions valid for the far-zone are given. (Author)

AD-609 693 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
PETROGRAPHIC INVESTIGATION OF THE LUNAR

SURFACE BY JOINT USE OF PHOTOMETRIC AND COLORIMETRIC OBSERVATIONS,
by V. V. Sharonov. Dec 64, 19p
RSIC 344; TT 65 60567

Unclassified report

Trans. of Astronomicheskii Zhurnal (USSR) 1954, v. 31, no. 5, p. 442-452.

Descriptors: (*Petrography, Moon), (*Moon, Extra-terrestrial topagraphy), (*Spectra (Visible and ultraviolet), Moon), Surfaces, Photometers, Colorimetry, Rock (Geology), Luminescence, Brightness, Color, Earth, Meteorites, Albedo (Astronomy), Spectroscopy, Polarization, Minerals, Optical properties.

A statistical comparison between the lunar surface and the earth's rocks and materials with respect to color and luminosity was carried out in an article based on published materials. It was established that a simultaneous similarity for the distribution curves according to brightness and color between the moon on the one hand and the earth's rocks and meteorites on the other was not obtained. The various assumptions introduced in order to explain the color characteristics of the lunar surface are discussed. The most reliable is the hypothesis according to which the lunar surface is covered by a porous vesicular slag formed from bedrock under the action of explosions accompanying the meteorite impacts.

AD-609 714 Div. 2
OTS Prices: HC $3.00/MF $0.75

Texas A. and M. Univ., College Station.
NORTHEAST GULF OF MEXICO HYDROGRAPHIC SURVEY DATA COLLECTED IN 1963,
by R. D. Gaul and R. E. Boykin. 30 Nov 64, 89p
TAMU Ref-64-26T
Contract Nonr21194, Projs. 286D, NR083 036

Unclassified report

See also AD-609 715.

Descriptors: (*Hydrographic surveying, Mexico Gulf), (*Oceanology, Mexico Gulf), Oceanographic data, Temperature, Salinity, Ocean currents, Ocean bottom topography, Depth finding, Maps, Tables, Graphics.

The survey region extends from the Mississippi Delta to Cape San Blas (about 200 nautical miles) and offshore to the 200 fathom depth contour (50 to 70 nautical miles). The surveys serve two primary purposes. One is to provide 'background' information on the physical environment over the shelf to aid in interpretation of phenomena observed in the vicinity of nearshore platforms off Panama City (Gaul, et al, 1963). The second is to study the distribution of physical properties as related to circulation over and outside the shelf. Studies of environmental influences on the distribution and occurrence of pelagic fishes (Vick, 1964) and 'fouling' organisms (Gaul and Vick, 1964; Pequegnat, Gaul and Dean, 1964) also depend on survey data.

AD-609 715 Div. 2, 16
OTS Prices: HC $3.00/MF $0.75

Texas A. and M. Univ., College Station.
THE MARINE ICHTHYOFAUNA OF ST. ANDREW BAY, FLORIDA, AND NEARSHORE HABITATS OF THE NORTHEASTERN GULF OF MEXICO,
by N. G. Vick. 31 Aug 64, 81p TAMU Ref-64-19T
Contract Nonr211904, Projs. NR083 036, 286D

Unclassified report

Descriptors: (*Fishes, Mexico Gulf), (*Marine biology, Mexico Gulf), Biology, Aquatic animals, Tropical regions, Collecting methods, Identification, Classification, Oceanology, Ecology.

Contents:
Collection procedures and identification of species; description of the collection area; Species: amphioxi, petromyzonida, selachii, batoidei, lepisosteida, isospondyli, iniomi, ostariophysi, apodes, synentognathi, microcyprini, solenicthyes, percomorphi, plectognathi, scleroparei, discocephali, heterosomata, haplodoci, pediculata; systematic list of species and references to families; selected taxonomic references; and selected distribution, range and zoogeographic references.

AD-609 723 Div. 2
OTS Prices: HC $3.00/MF $0.75

Atmospheric Research Lab., Oklahoma Univ. Research Inst., Norman.
DIURNAL AND SEMIDIURNAL VARIATIONS OF ISOPYCNIC SURFACES UP TO THE MESOPAUSE AS INFERRED BY THE WIND FIELD.
Scientific rept. no. 4,
by David Eugene Pitts. Oct 64, 64p ARL(UORI)-1357-4
Contract AF19 628 489, Proj. 8624, Task 862402
AFCRL 64 650

Unclassified report

Descriptors: (*Atmospheric sounding, Air mass analysis), (*Wind, Periodic variations), (*Air mass analysis, Upper atmosphere), Atmosphere, Density, Mathematical models, Statistical analysis, Meteorology, Sounding rockets.

Slopes of surface of constant air density are determined from wind data gathered primarily by The Meteorological Rocket Network. These slopes are depicted as a function of altitude, latitude, season, and time of day. Where data permits, they are extended to 90 kilometers altitude. The results agree well with the known features of the density field and suggest additional characteristics of density behavior. (Author)

AD-609 740 Div. 2, 9, 32
OTS Prices: HC $3.00/MF $0.75

Agriculture Research Service, Cornell Univ., Ithaca, N. Y.
VERTICAL FLUXES WITHIN THE VEGETATIVE CANOPY OF A CORN FIELD, 1962.
Interim rept.,
by Kirk W. Brown. Aug 64, 98p CU-ARS IR-64-1
Task 1A0 11001B021 08

Unclassified report

Rept. on The Energy Budget at the Earth's Surface. Rept. in slightly modified form was Master's thesis.

Descriptors: (*Micrometeorolgy, Heat transfer), (*Heat transfer, Plants (Botany)), (*Earth, Heat transfer), (*Plants (Botany), Micrometeorolgy), Energy, Evapotranspiration, Moisture, Barometric pressure, Evaporation, Atmospheric motion, Carbon dioxide, Convection, Water vapor, Photosynthesis, Temperature, Surface properties, Boundary layer, Turbulence, Agriculture, Corn, Thermodynamics.

The energy budget approach was utilized to evaluate the vertical fluxes of sensible and latent heat by layers within a fully grown corn crop. The necessary data including net radiation, temperature and water vapor pressure profiles within the crop, as well as the smaller storage terms, were measured during 10-minute periods through-

out the daytime hours. An exponential relation with leaf area approximated the extinction of net radiation within the crop. The temperature profiles were characterized in midday by the establishment of a warm air layer within the center of the crop. The calculated exchange coefficients spanned a range of three orders of magnitude. Transpiration accounted for 46% of the net radiation; soil evaporation, 13%; and sensible heat, 32%. Although the crop transpired most rapidly near the top, the data demonstrate the influence of plant controlling factors in addition to the microclimatological parameters studied. (Author)

AD-609 767 Div. 2, 12
OTS Prices: HC $2.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
ANALYSIS OF DAYTIME RADIATION DATA FROM TIROS IV.
Scientific rept. no. 4,
by William Viezee and Paul A. Davis. Dec 64, 37p
Contract AF19 628 2777, Projs. 6698, 4448,
Task 669803
AFCRL 64 905

Unclassified report

Descriptors: (*Meteorological satellites, Solar radiation), (*Solar radiation, Albedo (Astronomy)), (*Cloud cover, Albedo (Astronomy)), Infrared radiation, Scattering, Reflection, Analysis, Radiometers, Pacific Ocean.

A sample of winter time data from the solar channels of TIROS IV over the eastern Pacific is examined to determine the dependence of the albedo on the anisotropy of scattered and reflected solar radiation. The analysis shows a significant increase in cloud albedo when the scattering angle decreases between 90 and 53 degrees. Data collected from the two solar channels of TIROS IV reveal a compatibility superior to that of similar data from the early orbits of TIROS III. Synoptic-scale cloud patterns shown in the photographs from TIROS IV are identified in the pattern analyses of coincident radiation data from Channels 2, 3, and 5. Data from the solar channels from three separate orbits, over backgrounds with varying cloudiness, are examined for degradation in instrumental response. Except possibly for the first few orbits, no physical interpretation can be attached to variations of the low-flux data from the solar channels. (Author)

AD-609 789 Div. 2
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF MEASURING DISTANCE,
by M. T. Prilepin. 23 Nov 64, 5p
FTD TT64 487; TT 65 60589

Unclassified report

Unedited rough draft trans. of Russian patent 155,949, appl. no. 794,291/26-10, 11 Sep 62.

Descriptors: (*Range finding, Optical equipment), (*Surveying, Optical equipment), Measurement, Light, Reflectors, Voltage, Phase (Electronics), Radio signals, Modulation Meters, Patents, USSR, Lasers.

A method of measuring distances based on the use of a light range meter with an active reflector working on fixed frequency is described. The phase delay in the active reflector is eliminated by control of the phase of the modulating voltage with respect to the light extremum visually observed during cophasal supply of the modulator and demodulator of the active reflector to increase the active range and broaden the possibility of observations during the daytime. The coherence of the oscillations of the modulating voltages of the base station and of the active reflector is ensured with the aid of a reference signal transmitted onto the active reflector along a radio channel from the generator of the modulating voltage of the base station.

AD-609 792 Div. 2
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CHANGES IN THE CHEMICAL COMPOSITION OF THE ATMOSPHERE FOLLOWING INTENSE IONIZATION IMPULSES.
Memo. rept.
by L. M. Branscomb and R. E. leLevier. Dec 64, 25p RM-4364-PR
Contract AF49 638 700

Unclassified report

Prepared in cooperation with Colorado Univ., Boulder.

Descriptors: (*Atmosphere, Chemical reactions), (*Ionospheric disturbances, Ionization), (*Ionization, Upper atmosphere), Reaction kinetics, Ionosphere, Geophysics, High altitude, Oxygen, Nitrogen, Electrons, Atoms, Nitrogen compounds, Oxides, Dioxides, Ozone, Nuclear explosions, Air pollution, Numerical analysis.

Free atoms of oxygen and nitrogen are introduced into the ambient atmosphere when electrons dissociatively recombine with positive ions. In the lower D-layer of the ionosphere it is found that for fractional ionization levels greater than about 10 to the minus 9th power this process dominates the attachment mechanism, thereby leading to the introduction of free atoms as contaminants. The nitrogen atoms oxidize to form nitric oxide on a relatively fast time scale. At a slower rate, the oxygen atoms react to form ozone. Finally, the nitric oxide and ozone react to form nitrogen dioxide. The concentration and the rate of formation of the species is studied as a function of altitude and intensity of the initial impulse of ionization. It is found that for initial ionization levels greater than about .00001, the ultimate ozone and nitrogen dioxide concentrations are determined solely by the reaction rate coefficients and the ambient concentration of molecular oxygen and are independent of the initial electron density. (Author)

AD-609 796 Div. 2
OTS Prices: HC $3.00/MF $0.75

Texas A. and M. Univ., College Station.
OBSERVATIONS OF TIDAL PERIODIC INTERNAL WAVES OVER A THREE DAY PERIOD OFF PANAMA CITY, FLORIDA.
Rept. for 19-22 Jun 62,
by Noel E. J. Boston. 31 Aug 64, 60p
TAMURef-64-20T
Contract Nonr211904, Projs. NR083 036, 286D

Unclassified report

Descriptors: (*Oceanology, Tides), (*Tides, Florida), Mexico Gulf, Ocean waves, Temperature, Salinity, Ocean currents, Periodic variations, Measurement, Marine geophysics.

Temperature, salinity, and current data were taken during the period from noon on 19 June to noon on 22 June, 1962, off Panama City, Florida. The survey covered an area of approximately 80 square miles in water depths from 60 to 100 feet. A study ot the data showed that the temporal variation in the depths of the top, center, and bottom of the thermocline were closely related to the

amplitude and phase of the surface tide. The relationship varied with depth and distance from shore. The thermocline intersected bottom at depths from 10 to 50 feet (depending on the state of the tide). Movements of the thermocline were both horizontal and vertical in rhythm with and similar to the motion of the surface tide. Associated with the vertical movement of the thermocline were well defined horizontal currents which rotated with the inertial period. It is suggested that the system observed consists of a progressive tidal wave coupled with an internal edgewave, both propagating northwestward parallel to shore. (Author)

AD-609 803 Div. 2
OTS Prices: HC $3.00/MF $0.75

McGill Univ., Montreal (Quebec).
HEAT TRANSPORT BY LARGE-SCALE ATMOSPHERIC WAVES DURING OCTOBER 1959-MARCH 1960.
Scientific rept. no. 10,
by Calvin E. Anderson. Sep 64, 63p AMRG-PM-69
Contract AF19 604 8431, Proj. 8628, Task 862807
AFCRL 64 856

Unclassified report

Descriptors: (*Atmospheric motion, Heat transfer), (*Heat transfer, Atmospheric motion), Northern Hemisphere, Atmosphere, Transport properties, Heat, Meteorology, Thermodynamics, Fourier analysis.

A spectral analysis of northward heat transport in the northern hemisphere was performed by the Fourier analysis method. This method was applied at 500 mb, 100 mb and 25 mb for five-day intervals from October 5, 1959 through March 28, 1960. A comparison of stratospheric warmings of this period with those of the previous year studied by Boville (1961), revealed that the heat transport could be accomplished mainly by wave numbers one and/or two. From 500-mb, 100-mb and 25-mb time-sections of northward heat transport, divergences were determined to calculate the local temperature time derivatives. These derivatives were in turn compared with the actual time-sections of mean temperature. This comparison showed that, due to strong convergence of northward heat transport, the winter stratosphere at high latitudes had a net ascending motion. (Author)

AD-609 820 Div. 2, 30
OTS Prices: HC $4.00/MF $1.00

Burroughs Corp., Radnor, Pa.
STORM RADAR DATA PROCESSOR EVALUATION.
Final rept.,
by John Bradley. 31 Aug 64, 135p
Contract AF19 625 2956, Proj. 6672, Task 667201

Unclassified report

Descriptors: (*Data processing systems, Meteorological radar), (*Meteorological radar, Data processing systems), (*Weather forecasting, Meteorological radar), Test equipment (Electronics), Reliability (Electronics), Data storage systems, Computer logic, Integrators (Computers), Display systems, Mathematical analysis, Power supplies, Sampling, Probability.

A comprehensive evaluation of the Storm Radar Data Processor (STRADAP) system was made in order to determine its capabilities, accuracy, reliability, and limitations and to make recommendations for product improvement modifications which would advance STRADAP to an accurate meteorological instrument. In order to properly evaluate and improve the operating characteristics and reliability, two phases of evaluation were performed: analysis and evaluation of the hardware and theoretical or mathematical analysis of the concepts utilized. The hardware analysis consists in testing, through the use of standard test equipment and under normal operating conditions, individual circuits, logic blocks, and the entire system to ensure correct function, tolerances, accuracy, and reliability. As a result of this evaluation, modifications deemed necessary were designed, fabricated, installed, and checked out. Math analysis was performed to evaluate the sampling techniques and averaging techniques used by STRADAP, as well as the capability of the input radar video to provide sufficiently accurate information to allow STRADAP to accomplish the conversion to an accurate digital representation of cloud and storm formations within the range of the radar. (Author)

AD-609 839 Div. 2
OTS Prices: HC $3.00/MF $0.75

Woods Hole Oceanographic Institution, Mass.
EROSION OF THE CLIFFS OF OUTER CAPE COD: TABLES AND GRAPHS,
by John M. Zeigler, Herman J. Tasha, and Graham Giese. Jun 64, 91p WHOI-Ref-64-21
Contracts Nonr125400, Nonr219600, Proj. NR388 018

Unclassified report

Descriptors: (*Terrain, Erosion), (*Erosion, Massachusetts), Beaches, Tables, Graphics, Statistical data, Reviews.

The following tables and graphs place in convenient storage the results of several years of careful surveying and at the same time provide rudimentary interpretation of results by comparing erosion rates. Listed in the bibliography are pertinant published papers which analyze these coastal erosion data in great detail. (Author)

AD-609 844 Div. 2, 4
OTS Prices: HC $2.00/MF $0.50

Ionosphere Research Lab., Pennsylvania State Univ., University Park.
IONOSPHERIC PROCESSES AND NITRIC OXIDE.
Scientific rept.,
by Marcel Nicolet. 20 Dec 64, 33p IRL-228
Contract AF19 628 4014; Grant NSF GP2914,
Projs. 5710, 8605, Tasks 860502, 7.010
AFCRL 64 948

Unclassified report

Also sponsored by Defense Atomic Support Agency, Washington, D. C., Sub-Task 7.010.

Descriptors: (*Ionosphere, Chemical reactions), (*Nitrogen compounds, Ionosphere), Ionization, Dissociation, Recombination reactions, Oxygen, Ions, Oxides, Photochemistry, Cosmic rays, Sky brightness.

Analysis of ionic processes in the ionosphere leads to the conclusion that nitric oxide and its ion are produced by a reaction between nitrogen molecules and molecular oxygen ions. Such a process implies a substantial increase of nitric oxide in the E layer to a value greater than the photochemical concentration. In the lower D region, N(+)2 and O(+)2 ions produced by cosmic rays are transformed into NO(+) ions. A quantitative estimate shows that these conclusions are consistent with observational data in the chemosphere and ionosphere and also suggests the explanation of the night airglow continuum. (Author)

AD-609 853 Div. 2
OTS Prices: HC $3.00/MF $0.75

Woods Hole Oceanographic Institution, Mass.

DEEP CURRENT MEASUREMENTS NORTH OF PUERTO RICO,
by John G. Bruce, Jr. Jul 64, 59p WHOI-Ref-64-34
Contract Nonr286600, Proj. NR287 004
Unclassified report

Rept. on Project Artemis.
Reissued as ARTEMIS rept. no. 38, by Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y., Contract Nonr26666.

Descriptors: (*Ocean currents, Measurement), (*Oceanographic data, Atlantic Ocean), Puerto Rico, Oceanographic vessels, Hydrographic surveying, Temperature, Salinity, Oxygen.

Deep current measurements were made north of Puerto Rico from October to November 1961 using neutrally-buoyant floats, drogues, and hydrographic stations. In general, random currents were found above 1500 meters with the greatest instantaneous current speed being approximately 15 cm/sec. Between 1500 meters and 4500 m. the flow was generally towards the east with little apparent turbulence and with a maximum current between 1500-2000 meters of approximately 10-12 cm/sec.

AD-609 854 Div. 2
OTS Prices: HC $4.00/MF $1.00

Scripps Institution of Oceanography, Univ. of California, La Jolla.
GENERAL OCEANOGRAPHY AND LONG RANGE RESEARCH.
Annual progress rept. for Jul 63-Jun 64.
1 Nov 64, 116p SIO Ref-64-11
Contracts Nonr221612, Nonr221623, Projs. NR083 005, NR083 502
Unclassified report

Descriptors: (*Oceanology, Scientific research), Oceans, Physical properties, Chemical properties, Marine geology, Sedimentation, Ocean bottom topography, Tides, Ocean currents, Marine biology, Oceanographic equipment, Marine engineering.

The work embraced studies of waves; currents, circulation, mixing, and turbulence (based on measurements of water motion, distribution of dissolved substances, and temperature distribution); the morphology of the sea bottom and processes controlling it; the materials of the sea bottom, and the sub-bottom structure; the movement of beach material and shallow sediments; the distribution of organisms as related to their own biotic properties and to the properties of water masses and sediments; and the development of instruments and other equipment.

AD-609 861 Div. 2
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
VERY LOW FREQUENCY ENVELOPE SPECTRA OF SOLAR RADIO BURSTS.
Environmental research papers,
by Santimay Basu. Nov 64, 38p
Proj. 5629
AFCRL 64 941; AFCRL ERP71 Unclassified report

Descriptors: (*Extraterrestrial radio waves, Extremely low frequency), (*Radio astronomy, Solar radiation), Solar corona, Noise (Radio), Bandwidth, Broadband, Narrowband, Space charges, Frequency modulation, Plasma oscillations, Magnetic recording systems, Attenuation, Propagation.

The nature of amplitude fluctuation in solar radio bursts was studied. The very low frequency envelope spectra of radio noise from the quiet sun is uniform which conforms theoretically to Gaussian noise, and experimentally to a laboratory noise source. Type I solar bursts are characterised by broad-band enhancement in the envelope spectra, while Types II and III solar bursts depict narrow band regions of high spectral intensity in the envelope spectra. Type IV bursts yield a uniform spectra with narrow bands of attenuation. An explanation of the above in the case of Types I, II and III solar bursts is attempted by considering space charge wave amplification in the solar corona and assuming that the stream velocity has a very low frequency modulation. (Author)

AD-609 862 Div. 2, 25
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
A COLLATION STUDY OF A HIGHLY MAGNETIC PERIOD (SEPTEMBER 20-23, 1963).
Environmental research papers,
by Herbert M. Silverman and Barbara A. Ramsey.
Dec 64, 36p
Proj. 4643
AFCRL 64 979; AFCRL ERP72
Unclassified report

Descriptors: (*Terrestrial magnetism, Solar disturbances), (*Solar disturbances, Terrestrial magnetism), (*Radio astronomy, Solar disturbances), (*Extraterrestrial radio waves, Terrestrial magnetism), Solar flares, Sunspots, Solar radiation, Cosmic rays, Cosmic ray bursts, Magnetic storms, Ionosphere, Ionospheric disturbances, Upper atmosphere, Magnetometers, Aurorae, Radar, Astronomical data.

There was considerable solar activity during the month of September, which reached a peak on September 20. On September 21 - 22, there were three magnetic disturbances, the last two being of extremely high intensity with the KFr reaching a value of 9. A noticeable increase was seen in the scintillation rate, the scintillation index, and the Faraday fading rate of the signal received from 1961 Omicron I. During Revolution 11314, the Faraday fading rate was the fastest ever recorded at the Sagamore Hill Radio Observatory. The effect of the irregularity structure in the ionosphere on the satellite signal during the highly disturbed magnetic conditions has been thoroughly investigated. A 10 Mc total power receiver showed the highest absorption level ever recorded by this equipment when a change of 21 db from the normal level was seen. Variations in the level of absorption on a 30 Mc riometer corresponded very closely with the progress of the various magnetic disturbances. An ionosonde evinced a marked change in the ionospheric structure with the spreading in the F layer being of an extreme nature. Magnetometer records were in excellent agreement with the records from the various pieces of equipment. Data from a 19 Mc auroral radar provided evidence of a southward movement of the irregularity structure in the ionosphere during this period of interest. (Author)

AD-609 879 Div. 2
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NOTES ON THE BEGINNINGS OF MODERN METEORITICS,
by Paul M. Sears. Jan 65, 11p P-3042
Unclassified report

Descriptors: (*Meteorites, Theory), (*Astronomy, Meteorites), Meteors, Extraterrestrial topography, Sources, Celestial mechanics, History.

Soon after the beginning of the 19th Century, meteoritics was established as a cosmic science, but the general range of both its cosmic and terrestrial associations was not yet known. Furthermore, the science was primarily descriptive in nature. During the 19th Century it was to draw freely from other developing branches of knowledge to provide analytical explanations for many of its basic phenomena. In particular it would apply thermodynamics to help explain atmospheric retardation, and greatly improved astronomical observations to clarify the cosmic relations of shooting stars. (Author)

3. Chemical Warfare Equipment and Materials

AD-609 582 Div. 3, 29
OTS Prices: HC $3.00/MF $0.75

Spacelabs, Inc., Van Nuys, Calif.
DYNAMIC MEASUREMENTS OF PROTECTIVE MASKS.
Final rept. for Jun 63-Dec 64,
by Robert N. Sato. 5 Dec 64, 67p
Spacelabs-SR-64-1014 (7200)
Contract DA18 108AMC228A

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-415 280.

Descriptors: (*Protective masks, Test methods), (*Radio receivers, Protective masks), (*Radio transmitters, Protective masks), (*Modules (Electronics), Protective masks), Measuring devices (Electrical and Electronic), Performance (Engineering), Pressure, Air, Respiration, Frequency modulation, Transducers.

A system was developed that is capable of detecting and measuring compartment pressure and respiratory flow conditions existing within a protective mask worn by subjects under dynamic operating conditions. The data are converted to an electrical signal and conveyed by means of FM transmission to the ground receiving station for immediate readout or infinite storage in a memory device such as a tape recorder. The complete gas mask system has an electronics module; a back pack with FM transmitter and batteries for supply of power; a ground receiving station with consoles, Brush Oscillograph recorder, and tape recorder; and a transducer, pneumotachometer, and battery charging cable.

AD-609 804 Div. 3, 13, 18
OTS Prices: HC $4.00/MF $1.00

Litton Systems, Inc., St. Paul, Minn.
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES.
Bimonthly Progress rept. no. 7, 1 Jul-31 Aug 64,
by M. I. Landsberg. 30 Oct 64, 119p LSI-2651
Contract DA18 108AMC214A, Proj. 52405

Unclassified report

See also AD-603 661.

Descriptors:(*Shelters, Chemical warfare), (*Biological warfare, Armed forces research), (*Decontamination, Biological warfare agents), (*Chemical warfare, Armed forces research), Bacterial aerosols, Control systems, Environmental tests, Cooling and ventilating equipment, Protective coverings, Polymers, Nylon, Laminates, Tents, Adhesives, Shear stresses, Vacuum cleaners, Purification, Simulation, Medical research, Power supplies, Fluid dynamic properties, Military medicine.

Suitable decontamination procedures were developed for a medical field facility of 1 GPT Medium and 2 GPT Large. All 3 tents were interconnected with airlocks and were pressurized so pressure decreased slightly in going from the surgical to the pre-operating to the decontamination tent. When Sm was the challenge aerosol and the ambient challenge was as high as 100,000 organisms/cu. ft, the number of organisms in the surgical tent was only 0.015/cu. ft. Excellent results were also obtained when DMMP and DOP, respectively, were used as G and V agents. Thus the systems we have developed can provide the same magnitude of collective protection as the M17 gas mask. Extensive effort was expended in the environmental control system (ECS) area. Testing was carried out on the 60-cycle portable package and the 400-cycle ECS package. The 60-cycle unit had a capacity of 43,600 Btu/hr which satisfied the cooling requirements for a GPT Medium with 3/4-inch insulation. Capacity tests (not yet completed) on the 400-cycle system varied from 45,000 to 51,000 Btu/hr when the wet bulb varied from 70 to 77 degrees and when the dry bulb was 90 degrees on the cold side and 115 degrees on the hot side.

AD-609 805 Div. 3, 13, 18
OTS Prices: HC $4.00/MF $1.00

Litton Systems, Inc., St. Paul, Minn.
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES, VOLUME I.
Feasibility and design summary rept., vol. 1,
Phases 1 and 3, 28 Jun 63-30 Sep 64,
by M. I. Landsberg. 30 Sep 64, 125p LSI-2630, vol. 1
Contract DA18 108AMC214A, Proj. 52405

Unclassified report

See also AD-609 806.

Descriptors: (*Shelters, Chemical warfare), (*Biological warfare, Armed forces research), (*Decontamination, Biological warfare agents), (*Chemical warfare, Armed forces research), Bacterial aerosols, Environmental tests, Cooling and ventilating systems, Protective coverings, Protective clothing, Textiles, Polymers, Tents, Adhesives, Fluid dynamic properties.

It was demonstrated that technically it is entirely feasible to provide relatively long-term protection to personnel against B and C agents. To achieve these levels of protection requires (1) An impermeable agent-resistant material as a liner, (2) A recirculation system to rapidly lower the concentration of solid or liquid particulates and high and low volitility gases, (3) An air lock constantly purged with clean air to reduce the level of contaminants that can be introduced into the primary shelter, (4) Pressurization of the shelter and air lock to reduce the possibility of containments penetrating through openings, (5) Development of a procedure to reduce re-aerosolization of solid or liquid particulates and vaporization of gaseous agents, (6) A means of providing clean filtered air to the occupants and for pressurizing the shelter.

AD-609 806 Div. 3, 13, 18, 26
OTS Prices: HC $3.00/MF $0.75

Litton Systems, Inc., St. Paul, Minn.
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES, VOLUME II.
Feasibility and design summary rept., vol. 2, Phases 1 and 3, 28 Jun 63-30 Sep 64.
30 Sep 64, 92p LSI-2630, vol. 2
Contract DA18 108AMC214A, Proj. 52405

Unclassified report

See also AD-609 805.

Descriptors: (*Shelters, Chemical warfare), (*Biological warfare, Armed forces research), (*Decontamination, Biological warfare agents), (*Chemical warfare, Armed forces research), (*Manufacturing methods, Shelters), Military medicine, Hospitals, Medical equipment, Tents, Military requirements, Cooling and ventilating equipment, Packaging, Materials, Specifications,

Reliability, Quality control, Maintenance, Costs, Design, Failure (Mechanics), Environmental tests, Mechanical drawings.

Development of a CB Collective Protection Kit for the GPT-Medium (as used in the rest and relief station and for field medical facilities such as the clearing stations, field hospitals, evacuation hospitals and first aid stations) is described. For ease of discussion, the development plan is divided into three major work efforts: the prototype development ED (engineering design), which begins with the approval to proceed with the development program and ends with the delivery of prototypes for testing by the Government; the ET/ST (engineering test/service test), which begins when Government testing has been completed, items approved, and Class I drawings prepared and ends with the delivery of the ET/ST models. The third and final effort is the test support phase. The program plan for each of these tasks is described. The PERT charts furnished in Appendix VI present the procedure and time requirements for accomplishing these tasks.

AD-609 840 Div. 3, 2, 30
OTS Prices: HC $1.00/MF $0.50

Metronics Associates, Inc., Palo Alto, Calif.

CALCULATION OF EFFICIENCIES OF AEROSOL GENERATING DEVICES FROM FLUX MEASUREMENTS OBTAINED IN FIELD TRIALS,
by Robert W. McMullen. 18 Nov 64, 25p
Metronics-TR-111
Contract DA42 007AMC21R

Unclassified report

Descriptors: (*Aerosol generators, Effectiveness), (*Aerosols, Measurement), (*Particles, Measurement), Aircraft, Vehicles, Wind, Sprays, Tests, Test methods, Airborne.

A method used for calibrating aircraft-mounted aerosol generators has involved a 'fly-by' of the aircraft upwind of a sampling array on a tall tower. This method is re-examined to determine whether it is suitable for calibrating aerosol generators mounted on slow-moving ground vehicles. It is shown that when the vehicular speeds are as small as only twice the wind speed, the calibration results are likely to be erratic and many trials must be run to obtain a reasonably good estimate of the aerosol generator's efficiency. (Author)

4. Chemistry

AD-609 440 Div. 4
OTS Prices: HC $2.00/MF $0.50

American Oil Co., Whiting, Ind.
THE RADIATION CHEMISTRY OF ACETYLENIC COMPOUNDS.
Rept. for 30 Nov 62-31 Jul 64,
by R. E. Rondeau, L. A. Harrah, T. D. Nevitt, H. H. Barber, Jr., and R. Schaffer. Nov 64, 30p
Contract AF33 616 8247, Proj. 7367, Task 736701
ML TR64 353

Unclassified report

Descriptors: (*Aliphatic compounds, Radiation chemistry), (*Radiation chemistry, Aliphatic compounds), Decomposition, Polymerization, Free radicals, Aromatic compounds, Nitriles, Chromatographic analysis.

The distribution of products from the radiolysis of butyne-2, propyne, pentyne-2, hexyne-3 and butyne-1 are given. Dimers, trimers and tetramers, of empirical formulae CnH2n, CnH2n-2 and CnH2n-4, are formed in the following relative concentration: (Dimers) >> (Trimers) >> (Tetramers). A general mechanism on the basis of free radical reactions is invoked to account for this distribution. In addition, aromatic products are also formed. (Author)

AD-609 448 Div. 4, 14
OTS Prices: HC $1.00/MF $0.50

National Bureau of Standards, Washington, D. C.
FLUOROCARBON POLYMERS. PERFLUORO-POLYTOLYLENES,
by Walter J. Pummer and Leo A. Wall. Dec 64, 23p
Proj. 31102 11 3110522
NBS 8594

Unclassified report

Descriptors: (*Fluorine compounds, Polymers), (*Halocarbon plastics, Synthesis (Chemistry)), (*Heat-resistant plastics, Synthesis (Chemistry)), Elastomers, Halogenated hydrocarbons, Aromatic compounds, Grignard reactions, Physical properties, Solubility, Molecular weight, Pyrolysis, Stability, Distillation.

Perfluoro-polytolylenes were prepared by treating 2-chloroheptafluorotoluene with magnesium in tetrahydrofuran. Polymerization occurred readily at 0C. High molecular weight polymers were prepared by refluxing the mixture as long as 5 days. Soluble polymers were obtained having molecular weights of 5100; 35,600; 88,500; and 200,000. These polymers exhibited good thermal stability in a vacuum of 600C. (Author)

AD-609 557 Div. 4, 25
OTS Prices: HC $2.00/MF $0.50

Leicester Univ. (England).
THE EFFECT OF ADDED ELECTROLYTES ON THE E. S. R. AND OPTICAL ABSORPTION OF METAL-AMMONIA SOLUTIONS.
Scientific rept. no. 5,
by M. C. R. Symons. Jun 64, 31p
Grant AF EOAR62 64
AFOSR 64 2429

Unclassified report

Descriptors: (*Ammonia, Solutions), (*Metals, Solutions), (*Electrons, Spectroscopy), Mathematical models, Chemical equilibrium, Electrolytes, Ions, Water, Alcohols, Crystal lattices, Color centers, Alkali metal compounds, Hydroxides, Iodides, Nuclear magnetic resonance, Absorption spectrum, Atomic energy levels, Great Britain.

A confined model for the solvated electron is developed by analogy with related systems, and is used to describe the spectral properties of electrons trapped in various media. The nature of the diamagnetic species in metal solutions is discussed in view of the proposed model. (Author)

AD-609 558 Div. 4, 14
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
MODELS FOR ASYMMETRIC INDUCTION IN POLYMERIZATION.
Final rept. for 1 Oct 62-1 Oct 64,
by Donald J. Cram. 2 Nov 64, 3p
Grant AF AFOSR124 63
AFOSR 64 2483

Unclassified report

Descriptors: (*Polymerization, Catalysis), Polymers, Molecular properties, Protons, Chemical reactions, Solvents, Models (Simulations).

Studies on the reaction mechanisms for base-catalyzed 1,3- and 1,5-proton migrations in unsaturated systems are briefly summarized.

AD-609 569 Div. 4, 14
OTS Prices: HC $2.00/MF $0.50

Barcelona Univ. (Spain).
A STUDY OF THE SYNTHESIS AND PROPERTIES OF ALKAROMATIC CHLOROCARBONS.
Final technical rept.,
by Manuel Ballester. Sep 64, 33p
Contract AF61 052 141, Proj. 7023, Task 7023 01
ARL 64 141

Unclassified report

Descriptors: (*Halogenated hydrocarbons, Synthesis (Chemistry)), (*Chlorine compounds, Aromatic compounds), Ketones, Carboxylic acids, Esters, Fluorenes, Polymers, Chlorination, Physical properties, Spectra (Visible and Ultraviolet), Chemical analysis.

The preparation and study of 55 new highly chlorinated compounds, including 31 chlorocarbons, 4 perchloroketones, 4 perchloroacids and 4 perchloroesters is reported. The chlorocarbons consist of derivatives of toluene, xylene, styrene, stilbene, p-xylylene, diphenylmethane, biphenyl, anthracene, phenanthren, fluorene, and benzene and biphenyl polymeric chlorocarbons. (Author)

AD-609 578 Div. 4
OTS Prices: HC $3.00/MF $0.75

Brandeis Univ., Waltham, Mass.
ON THE COMPOSITION OF DILUTE ALKALI METAL-AMMONIA SOLUTIONS.
Technical rept. no. 13,
by Sidney Golden, Charles Guttman, and Thomas R. Tuttle, Jr. 25 Nov 64, 62p
Contract Nonr167701, Proj. NR051 362

Unclassified report

Descriptors: (*Ammonia, Alkali metals), (*Alkali

metals, Ammonia), Solutions, Chemical equilibrium, Nuclear spins, Vapor pressure, Electrical conductance, Partial differential equations, Absorption spectrum, Sodium, Potassium, Ions, Ionization, Solvates, Solvent action.

Dilute solutions of the alkali metals in liquid ammonia are assumed to consist of the following constituents: M+, the solvated metal cation; S, the solvent; M-, the solvated metal anion; S-, the solvent anion (solvated electron); the ion-pairs M+.M- and M+.S-. These species are assumed to be in equilibrium via M+ + 2S- reversibly yields M- + 2S and M+ + A- reversibly yields M+.A-, where A- is either M- or S-. With generally good results being obtained, the foregoing model has been applied to account for the following properties of alkali metal-ammonia solutions which are more dilute than about 0.10 M: (1) the spin paramagnetic susceptibilities reported by Hutchison and Pastor; (2) the vapor-pressure depression results of Kraus; (3) the electrical conductances measured by Kraus and the temperature coefficients of conductance, reported by Gibson and Phipps; (4) the Knight shifts for N14 and Na23, reported by McConnell and Holm, Acrivos and Pitzer and O'Reilly; (5) the optical absorption results of Gold and Jolly, and those of Dye and Douthit. An a postiori argument supports the neglect of ion-triples for the solutions which have been considered, and reinforces a distinction to be made between the metal anion Na- and the analogous ion-triple S-.Na+.S-.

AD-609 609 Div. 4, 14
OTS Prices: HC $1.00/MF $0.50

Monsanto Research Corp., Everett, Mass.
CHEMILUMINESCENT SYSTEMS.
Technical rept. no. 2.
15 Dec 64, 24p MRB3009Q2
Contract Nonr451100, ARPA order 299, Task NR356 464
Unclassified report

Descriptors: (*Luminescence, Materials), Selection, Oxidation, Emissivity, Ketones, N-meterocyclic compounds, Nitrates, Peroxides, Solvents.

Major emphasis was placed upon the screening program for chemiluminescent autoxidation reactions. Weak chemiluminescence was observed for almost all base-catalyzed reactions in aprotic solvents. The brightest visible emissions observed thus far have been the oxidations of benzoin and of 2-benzylimidazoline. The luminescence of lucigenin in alkaline peroxide oxidation in mixed solvents was studied as a function of THF concentration. Within the bounds determined by product precipitation, the peak intensity, total emission 'figure-of-merit', and decay rate increase with THF concentration. Striking correlation was observed between the decay half-lives of the chemiluminescence of the lucigenin solution and of the lucigenin-free solution at the same reagent levels. (Author)

AD-609 650 Div. 4
OTS Prices: HC $1.00/MF $0.50

Cincinnati Univ., Ohio.
THE DETERMINATION OF CHLORINE AND IONIC CHLORIDE IN ORGANIC COMPOUNDS.
Rept. for Jun-Aug 64,
by Thomas M. Downer, Jr. Nov 64, 16p
Contract AF33 657 10944, Proj. 7360, Task 736005
ML TR64 344
Unclassified report

Descriptors: (*Chlorine, Volumetric analysis), Organic compounds, Chlorine compounds, Chlorides, Ions, Chemical analysis, Silver compounds, Nitrates, Chemical indicators, Fluorescence, Buffers.

A rapid method for the determination of chlorine is described. The method is applicable to the chloride ion formed following an oxygen flask combustion procedure or for soluble ionic hydrochlorides. The percentage of chloride is determined by titrating the chloride ion with silver nitrate using an adsorption indicator, 2',7'-dichlorofluorescein to detect the endpoint. Compounds containing carbon, hydrogen, nitrogen, chlorine and sulfur were successfully analyzed. (Author)

AD-609 664 Div. 4, 14
OTS Prices: HC $0.50/MF $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
DETERMINATION OF STYRENE MONOMER IN POLYESTER RESINS BY GAS-LIQUID CHROMATOGRAPHY.
Final rept.,
by George G. Esposito. 3 Dec 64, 15p
Proj. 1C024401A328
CCL 173
Unclassified report

Descriptors: (*Polyester plastics, Chromatographic analysis), (*Aromatic compounds, Chromatographic analysis), Plastic coatings, Impurities, Chemical analysis, Solvent extraction, Ion exchange, Standards.

Styrene, as well as other unsaturated monomers, are employed as cross-linking agents for unsaturated polyesters resins, and a suitable method of analysis for styrene is needed. Gas liquid chromatography (GLC) was used to determine styrene monomer without interference from other cross-linking compounds. A simple, solvent separation was utilized to separate the resin prior to the GLC analysis. The GLC separation was conducted on a Triton X-305 column with methyl isobutyl ketone used as the internal standard. (Author)

AD-609 697 Div. 4, 14
OTS Prices: HC $4.00/MF $1.00

Frick Chemical Lab., Princeton Univ., N. J.
STUDIES IN IONIC COPOLYMERIZATION.
Doctoral thesis,
by A. V. Tobolsky and R. J. Boudreau. 11 Apr 61, 116p
Contract AF49 638 974
AFOSR 487; AFOSR AVT2
Unclassified report

Supported in part by American Lithium Inst., the Office of Ordnance Research, and the Thiokol Chemical Corp.

Descriptors: (*Copolymerization, Theory), (*Styrene plastics, Copolymerization), Ions, Reaction kinetics, Solvent action, Catalysts, Free radicals, Equations, Isoprene, Polyethylene plastics.

The copolymerization of styrene--isoprene with Lewis bases and isobutylene--p-chorostyrene with Lewis acids shows a dependence of copolymer composition on solvents and counterions. The work reported in this thesis was designed to shed light on two questions: (1) Is the effect of solvent and catalyst of general significance in ionic copolymerization. (2) Are ionic copolymerizations generally ideal. Copolymerizations were performed with styrene--alpha-methylstyrene, styrene--p-methylstyrene, styrene--p-methoxystyrene, and p-methylstyrene--p-methoxystyrene. Various Lewis acids and bases were used in several solvents. Reactivity ratios were calculated for all but the styrene-alpha-methylstyrene copolymers.

AD-609 712 Div. 4
OTS Prices: HC $1.00/MF $0.50

Strathclyde Univ., Glasgow (Scotland). Chemistry Dept.
FINAL REPORT THE REACTIONS OF INORGANIC COMPOUNDS IN NON-AQUEOUS SOLVENTS .
Final rept. for 1 Oct 61-30 Sep 64,
by D. W. A. Sharp. 30 Sep 64, 14p
Contract N62558 3061

Unclassified report

Descriptors: (*Fluorides, Chemical reactions), Inorganic compounds, Solvents, Organic compounds, Sulfuric acid, Metalorganic compounds, Hydrogen compounds, Transition elements, Phosphorus compounds, Complex compounds, Salts, Solubility, Spectra (Infrared), Synthesis (Chemistry), Great Britain.

Work dealing with various aspects of the reactions of inorganic compounds in non-aqueous solvents is summarized. The studies were carried out from a spectroscopic and a preparative point of view. Areas of investigation included the reaction of fluorosulfuric acid with organic compounds and metal carbonyls, reactions of metals in anhydrous hydrogen fluoride, preparation of adducts of phosphorus pentafluoride and decomposition to amido- and alkoxy-derivatives of phosphorus (V) fluoride, and solutions of first period transition metal salts in non-aqueous solvents.

AD-609 721 Div. 4, 6
OTS Prices: HC $2.00/MF $0.50

Parametrics, Inc., Waltham, Mass.
CHEMICAL-ELECTRICAL SENSING.
Interim rept. for 1 Feb-30 Jun 64,
by C. Levy, O. Cucchiara, and D. Chleck. Dec 64, 32p
Contract AF30 602 3305, Proj. 5534, Task 553402
RADC TDR64 388

Unclassified report

Descriptors: (*Gas detectors, Feasibility studies), (*Krypton, Gas detectors), Radioactive isotopes, Radiochemistry, Foils, Zinc compounds, Aluminum compounds, Copper compounds, Hydrogen compounds, Fluorides, Hydrochloric acid, Detection, Calibration, Sensitivity, Humidity, Radiation measurement systems.

An investigation was conducted to determine the feasibility of using krypton-85 homologs to detect trace quantities of hydrogen chloride and hydrogen fluoride in air. Zinc foil kryptonates were found to respond well to low hydrogen chloride concentrations and thus can serve as detectors. Calibration curves are presented for the range of hydrogen chloride concentrations from 97 ppb to 250 ppm for exposure times up to 3 hours. Relative humidity had no significant effect on the detection sensitivity. Aluminum and copper kryptonates showed satisfactory response to a hydrogen fluoride concentration of 263 ppm. A flow system for obtaining lower concentration was constructed. (Author)

AD-609 782 Div. 4, 8, 14, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTRIC AND MAGNETIC PROPERTIES OF THERMALLY TREATED FERROCENE BASE POLYMERS,
by A. A. Dolov, A. A. Slinkin, and A. M. Rubinshtein.
6 Jan 65, 12p
FTD TT64 1365; TT 65 60582

Unclassified report

Unedited rough draft trans. of Vysokomolekulyarnye Soedineniya (USSR) 1963, v. 5, no. 10, p. 1441-1445.

Descriptors: (*Ferrocenes, Physical properties), (*Semiconductors, Metalorganic compounds), (*Metalorganic compounds, Polymers), Iron compounds, Heat treatment, Electrical properties, Magnetic properties, Ferromagnetism, Molecular interactions, Molecular structure, USSR.

It was shown that the semiconductor properties of ferrocene base polymers are determined not only by the degree of conjugation along the individual polymeric chain, but mainly by the nature of packing and interaction of macromolecules in the polymer. The data obtained are in conformity with the assumption that the noticeable ferromagnetism of ferrocene polymers, which have been pressed and heated in vacuum, one cannot completely exclude the possibility of thermal decomposition of the polymer with the formation of ordinary ferromagnetic iron compounds. (Author)

AD-609 787 Div. 4, 14
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABOUT REACTIONS OF 8-OXYQUINOLINE TRIBUTOXY TITANIUM WITH d, W-DIHYDROXY-POLYDIMETHYL-SILOXANE,
by K. A. Andrianov and I. A. Lavygin. 1 Dec 64, 7p
FTD TT64 440; TT 65 60587

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Seriya Khimicheskaya, 1963, no. 10, p. 1857-1859.

Descriptors: (*Titanium compounds, Chemical reactions), (*Metalorganic compounds, Chemical reactions), (*Siloxanes, Chemical reactions), Polymers, Quinolines, Condensation reactions, Molecular weight, Spectra (Infrared), Transition temperature, USSR.

An investigation was made of the reaction of 8-oxyquinoline-tributoxytitanium with alpha, omega-dihydroxy-polydimethylsiloxanes and it was established that the butoxy group in the case of titanium is replaced by residues of alpha, omega-dihydroxy-polydimethyl-siloxane. Tris-(dimethyl-siloxanohydroxy)-8-oxyquinoline-titaniums were synthesized and their properties determined. (Author)

AD-609 800 Div. 4
OTS Prices: HC $3.00/MF $0.75

Monsanto Research Corp., Dayton, Ohio.
STUDIES OF LOW-TEMPERATURE OXIDATION REACTIONS.
Annual progress rept. no. 2, 1 Oct 63-30 Sep 64,
by L. Parts, J. T. Miller, Jr., and H. R. DuFour.
8 Jan 65, 63p
Contract Nonr397700

Unclassified report

See also 427 996.

Descriptors: (*Cryogenics, Chemical reactions), (*Organoboranes, Oxidation), (*Hydrocarbons, Nitration), Infrared spectroscopy, Catalyst, Organic solvents, Reaction kinetics, Synthesis (Chemistry).

The autoxidation of trimethylborane has been investigated spectroscopically at 90-110K. The reactions of nitrosonium

nitrate with some unsaturated hydrocarbons have been investigated at 77-195K. Ethylene, propene, and propyne were found to catalyze the isomerization of nitrosonium nitrate to a colorless isomeric species, presumably symmetrical dinitrogen tetroxide, in the presence of oxygen at 77-90K. Olefins that are more susceptible to electrophilic addition reactions undergo addition reactions. The reaction with isobutylene was investigated in detail by preparative vacuum line and by spectroscopic techniques. A very unstable solid, believed to be the cis-dimeric form of isobutylene nitrosonitrate, was isolated. 2-Nitrato-isobutyraldoxime is the more readily isolatable product upon warm-up to room temperature. Symmetrical dinitrogen tetroxide dissolves in isobutylene at 195K. and remains unreactive. The role of nitrosonium nitrate in reactions of N_2O_4 with olefins is discussed. A vertical-path infrared cryocell, applicable for the study of reactions in solution at temperatures above 60K are described.

AD-609 814 Div. 4
OTS Prices: HC $2.00/MF $0.50

Aerojet-General Corp., Azusa, Calif.
RATE OF SUBLIMATION OF AMMONIUM HALIDES, by R. F. Chaiken, D. J. Sibbett, J. E. Sutherland, D. K. Van de Mark, and A. Wheeler. Mar 62, 31p
AGC-TN-43
Contract AF49 638 851, Proj. 9750, Task 37501
AFOSR 9750

Unclassified report

Descriptors: (*Ammonium compounds, Halides), (*Halides, Sublimation), (*Sublimation, Ammonium compounds), Chlorides, Bromides, Iodides, Fluorides, Temperature, Heat of sublimation, Test methods, Quartz, Springs, Balances, Vacuum apparatus, Linear systems, Pyrolysis.

The rates of sublimation of ammonium chloride, bromide, iodide and fluoride have been determined by two different experimental techniques over the temperature range of 100 to 600C, corresponding to an increase in sublimation rate of .0010. The two experimental methods employed were the isothermal rate of weight loss, using a quartz spring balance, and the hot-plate linear pyrolysis method. The low activation energy (about one-third the heat of sublimation) found for ammonium chloride by earlier investigators has been verified and found to extend to the other halides. The frequency factor is also abnormally low for the ammonium halides, by a factor of roughly .001, with the exception of the fluoride, for which the factor is only about 500. These results are in fair agreement with the Schultz-Dekker mechanism for ammonium halide sublimation. (Author)

AD-609 875 Div. 4
OTS Prices: HC $5.00/MF $1.25

Air Force Office of Scientific Research, Washington, D. C.
CHEMISTRY PROGRAM REVIEW, FISCAL YEAR 1964, ed. by Alfred Weissler, Milton D. Sprinkel, and Orville Rollins. Nov 64, 189p
AFOSR 64 1872

Unclassified report

Descriptors: (*Chemistry, Reviews), Air force research, Reports, Bibliographics, Research program administration, Abstracting.

Contents: Aerospace Chemistry by Dr. A. Weissler, New Methods and Techniques by Dr. W. L. Ruigh, Inorganic Chemistry by D. W. Elliott, Chemical Reactivity and Mechanisms by Dr. A. Matuszko, Symposia by LtCol M. D. Sprinkel, Chemistry Program Statistic by Major O. W. Rollins, Reports Received in FY 1964 by Major O. W. Rollins, Current Chemistry Program, Projects Completed in FY 1964, Summaries of Completed Projects.

5. Communications

AD-609 627 Div. 5, 8, 25
OTS Prices: HC $3.00/MF $0.75

Rhode Island Univ., Kingston.
COMMUNICATION CHARACTERISTICS OF AN UNDERWATER ACOUSTIC SIGNAL REFLECTED FROM A SPACE AND TIME RANDOM SURFACE.
Technical rept. no. 7,
by R. A. D'Antonio and R. F. Hill. 18 Nov 64, 92p
Contract Nonr39612

Unclassified report

Descriptors: (*Underwater communication systems, Acoustics), (*Acoustics, Underwater communication systems), (*Communication theory, Underwater sound signals), Underwater, Sound transmission, Reflection, Ocean waves, Simulation, Model basins, Statistical functions, Underwater sound equipment, Data processing systems, Experimental data, Graphics, Communication systems.

This dissertation is concerned with a portion of the general underwater acoustics communication problem, namely the communication channel defined as the path from a transmitter to receiver via a single reflection from a surface which is random in space and time. A wind-driven random surface is produced in a model tank and is shown to closely approximate the ocean surface. The following results are of particular interest: (1) for a continuous sinusoidal signal reflected from the surface, the envelope of the received signal has a frequency spectral bandwidth greater than the bandwidth of the amplitude of the surface measured near the sonified area; (2) crosscorrelations observed between envelopes of an amplitude modulated transmission signal and envelopes of the received signal are low but finite indicating that although considerable distortion is introduced by the random surface, the channel can be used for communication and; (3) no correlation was found between the height variations of the surface and the envelope of the received signal.

AD-609 773 Div. 5, 8, 18, 30
OTS Prices: HC $2.00/MF $0.50

International Electric Corp., Paramus, N. J.
ON-SITE CATEGORY I PART I, ACCEPTANCE OF THE DATA DISPLAY CENTRAL GROUP DISPLAY CHAIN, AND CATEGORY II, PART I, INTEGRATION OF THE DATA DISPLAY CENTRAL GROUP DISPLAY AND REQUEST CHAINS WITH THE ELECTRONIC DATA TRANSMISSION COMMUNICATIONS CENTRAL.
Test rept.
30 Jul 64, 39p IEC-TR-53100-1, IEC-TR-50100-4
Contract AF19 626 8
ESD TDR64 514 Unclassified report
See also AD-603 850.

Descriptors: (*Command and control systems, Strategic Air Command), (*Data transmission systems, Strategic Air Command), (*Combat information centers, Strategic Air Command), (*Strategic Air Command, Data transmission systems), Display systems, Specifications, Electronic equipment, Military requirements, Air Force, Digital systems, Reliability (Electronics), Test methods, Tests.

This report describes the debugging, dry-run, and formal test activities. Demonstration testing was performed for the witnessing USAF Test Team as described herein. The DDC Group Display Chain Acceptance Testing was conducted in accordance with Appendix XV, Revision C of IEC Test Specification TS 53100 and modifications proposed by IEC and concurred upon by the USAF Test Team. Category II, Part I Integration Tests were performed in accordance with IEC Test Specification TS 50100D, Appendix C and IEC proposed modifications which were in agreement with the USAF Test Team. Overall conduct of the tests and the individual test results were satisfactory, although several discrepancies were noted on the DD Form 250 prepared to document this testing. (Author)

AD-609 872 Div. 5, 6, 12
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 7. ENGINEERING.
Quarterly progress rept. for 1 Sep-30 Nov 64.
15 Dec 64, 19p
Contract AF19 628 500, ARPA Orders 498, 600
ESD TDR64 587

Unclassified report

Proj. DEFENDER.

Descriptors: (*Optical tracking, Airborne), (*Space communication systems, Tests), Optical equipment, Tracking telescopes, Communication satellites (Active), Communication satellites (Passive), Satellite antennas, Telemetering antennas, Radar equipment, Instrumentation, Design, Engineering.

The report is principally concerned with three major projects. These are the Haystack antenna, the optical instrumentation of the KC-135 aircraft, and the Lincoln experimental communications satellite. The Haystack Hill experimental facility, formally dedicated on 8 October, is undergoing mechanical system testing and debugging, and final construction work within the radome and about the building is being completed. The major portion of Phase III of the optical instrumentation of the KC-135 aircraft under the PRESS Program was completed successfully before the plane departed for Honolulu on 11 November. Fabrication and environmental testing of the series of experimental communications satellites known as LES constitute the major effort of the Division at this time.

6. Detection

AD-609 436 Div. 6, 3, 16
OTS Prices: HC $1.00/MF $0.50

Army Limited War Lab., Aberdeen Proving Ground, Md.
BIOSENSING TECHNICS FOR HUMAN DETECTION. 1. THE FROG SKIN TRANSDUCER: PRELIMINARY EXPERIMENT.
Interim rept. for Jun-Sep 64,
by Alfred T. Kornfield, Clyde S. Barnhart, Sr., and Max Krauss. Nov 64, 18p ALWL-TM-64-06
Task 02B64

Unclassified report

Prepared in cooperation with Biosearch Co., Boston, Mass.

Descriptors: (*Transducers, Skin), (*Detection, Biophysics), (*Skin, Sensitivity), Amphibians, Organic compounds, Gas detectors, Molecular weight.

Isolated frog skin used as a transducer whose bio-electrical potential is measured as a function of chemical species and concentration, is shown to offer large, reproducible, reversible changes to a variety of organic substances of low molecular weight, over a concentration range of at least five log units. A high degree of variability of response between frog skins, and a lack of data on ultimate sensitivities at usefully low levels for selected substances, are major problems that remain to be examined. (Author)

AD-609 512 Div. 6, 9
OTS Prices: HC $2.00/MF $0.50

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
THE RADAR CROSS SECTION OF AN IONIZED WAKE OF A HYPERSONIC BODY,
by C. M. Chu and D. T. Politis. 11 Nov 61, 27p
Bendix BSC-28251, Bendix FS-61TN-1013
Contract AF04 647 911

Unclassified report

Descriptors: (*Hypersonic flow, Radar echo areas), (*Radar echo areas, Hypersonic flow), Gas ionization, Wake, Plasma medium, Plasma oscillations, Frequency, Electrons, Statistical distributions, Radar waves, Propagation, Scattering.

An effort was made to obtain a parametric estimate of the radar cross section of the ionized wake of a hypersonic body as a function of aspect angle, for a wide range of frequencies and values of the physical parameters involved. The solution is expressed as the solution to Maxwell's equations for an inhomogeneous medium. The following conclusions are drawn: (1) The cross section is proportional to the square to the electron density at the origin. (2) The cross section is insensitive to the wake length, except at near broadside view when it varies as the square of the length. (3) The effect of frequency on the cross section is introduced in two ways, by an inverse square relationship and by an exponential to the square of the frequency. Hence the cross section decreases rapidly as frequency increases. (4) For a constant flux of electrons crossing the z O plane, the plasma frequency is inversely proportional to the radar frequency. Hence, the effect of the radar frequency enters through the exponential term only, and the cross section decreases as the radar frequency increases.

AD-609 566 Div. 6, 2, 12
OTS Prices: HC $3.00/MF $0.75

Naval Research Lab., Washington, D. C.
FIRST ORDER OBLATENESS PERTURBATIONS AND THE U. S. NAVAL SPACE SURVEILLANCE SYSTEM.
Interim rept.,
by Thomas Blackhall Murtagh. 5 Nov 64, 77p
Proj. RT8801 001 652 1 3434 00 01
NRL 6169

Unclassified report

Master's thesis.

Descriptors: (*Satellites (Artificial), Orbital trajectories), (*Perturbation theory, Orbital trajectories), (*Space surveillance systems, Theory), Navy, Errors, Analysis, Earth models, Gravity, Experimental data, Motion, Equations, Position finding, Functional analysis, Harmonic analysis, Potential theory, Polynomials.

An error analysis is presented involving a comparison of position errors in the orbital path of an artificial earth satellite produced either by the inclusion or omission of first order oblateness effects on all of the orbital elements or by the introduction of theoretical errors into the system with which the measurements are made. The reasons for making the above comparison are twofold. First, if the improved model of the earth's gravitational field produces an increased accuracy in the orbital elements commensurate with the accuracy of the measuring system, then this more accurate model should be used in the derivation of any epoch set of orbital elements from raw data as well as in any scheme for predicting satellite position as a function of time from epoch. Secondly, if the improved model accuracy is indeed not comparable to the measuring system accuracy, then the inclusion of these first order effects is not necessary and their omission will reduce expenditures for the use of the high speed digital computer necessary for orbital element computation and updating.

AD-609 589 Div. 6, 15, 31
OTS Prices: HC $4.00/MF $1.00

Little (Arthur D.), Inc., Cambridge, Mass.
OPTIMUM SIGNAL DESIGN AND PROCESSING FOR REVERBERATION, LIMITED ENVIRONMENTS.
Technical rept.,
by H. L. Van Trees. Oct 64, 119p ALI-1501064
Contract NObsr81564, Proj. SS050

Unclassified report

Rept. on Project TRIDENT.

Descriptors: (*Target discrimination, Interference), (*Sonar signals, Interference), (*Mathematical models, Sonar signals), Sonar receivers, Sonar targets, Underwater sound signals, Matched filters, Statistical processes, Statistical functions, Special functions (Mathematical), Probability, Integral equations, Correlation techniques, Performance (Engineering), Noise, Detection.

The problem of designing optimum signals and receivers for an active sonar system in a reverberation-limited environment is studied. A suitable model of the reverberation return is developed. The return is characterized as a zero-mean non-stationary Gaussian random process with a correlation function which is assumed to be known. The structure and resultant performance of the optimum and conventional receivers are derived. Some general signal properties useful in signal design are derived. Two cases are considered in detail: reverberation which is homogeneous in range and results in interference which is a stationary Gaussian process, and reverberation which is non-homogeneous in range and results in a non-stationary Gaussian process. (Author)

AD-609 619 Div. 6, 2
OTS Prices: HC $5.00/MF $1.00

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
PROJECT WIDE BAND.
Final rept.,
by Walter A. Flood. 1 Nov 64, 162p UB-1363-P-6
Contract AF30 602 0277, Proj. 5579, Task 557902
RADC TDR64 461

Unclassified report

Descriptors: (*Radar interference, Atmosphere), (*Atmosphere, Radar interference), Multipath radar, Phase distortion, Resolution, Aurorae, Radio astronomy, Troposphere, Ionosphere, Broadband, Communication satellites (Passive), Refractive index, Interferometers, Nuclear explosions, High altitude, Propagation, Mathematical prediction, Probability, X band, Antennas, Attenuation, Target discrimination, Space communication systems, Radar signals, Radar echo areas.

The results of a theoretical and experimental program to determine the influence of the atmosphere on radar resolution are presented. The limits imposed by the atmosphere on resolution in range, angle and velocity are treated theoretically and estimated values are presented based on current experimental data. General expressions are derived which permit assessment of the atmospheric influence on resolution as a function of frequency. Consideration is given to multipath dispersion, phase fluctuations and unequal target cross sections. A description of a radio astronomy experiment which was performed to deduce the phase fluctuations incurred by a wave traversing the ionosphere is presented with the results obtained. Similarly an experiment performed to determine the tropospheric contribution to phase path fluctuations is presented along with a discussion of the validity of the data as limited by the measurement technique employed. An application of the data is included which provides an assessment of the influence of phase fluctuations on the performance of a focussed, multiple antenna, communications system. (Author)

AD-609 633 Div. 6, 12
OTS Prices: HC $3.00/MF $0.75

Continental Electronics Mfg. Co., Dallas, Tex.
AN/FPA-22(XW-1), AN/FPA-23(XW-1), L/UHF-BAND PENCIL BEAM RADARS.
Final rept.,
by Johnnie M. Stotts. Oct 64, 74p
Contract AF30 602 2819, Proj. 4506, Task 450608
RADC TDR64 336

Unclassified report

Descriptors: (*Guided missile tracking systems, Radar equipment), (*Radar equipment, Guided missile ranges), (*Radar tracking, Target recognition), Radar targets, Radar transmitters, Radar antennas, Radar receivers, Radar signals, Instrumentation, L band, Ultrahigh frequency, Radiofrequency amplifiers, Modulators, Recording systems, Magnetic recording systems, Radar echo areas.

Two L/UHF-Band Dual Pencil Beam Radar Systems, designated AN/FPA-22(XW-1) and AN/FPA-23(XW-1), were developed and placed into operation on the White Sands Missile Range, New Mexico. The primary purpose of these radars is to gather data on radar signatures of targets under the Athena Program. The L-Band operates at 1200 to 1311 mc while the UHF-Band operates at 425 mc ±5%. Instrumentation recording equipment is contained for acquiring permanent records as noted on oscilloscopes of target signatures. Correlation of the recordings with other missile range events is provided. Each radar installation is complete with dual frequency transmitter, dual frequency receiver, antenna, range interface equipment, and instrumentation recording equipment. The radars are not self-tracking but must be directed to the desired target by signals from other missile range radars or computers. Manual control of the antenna is also available. The radars are housed in equipment shelters provided specifically for that purpose. The site locations are near the terminal destination of the missile being tested. (Author)

AD-609 703 Div. 6, 12
OTS Prices: HC $1.00/MF $0.50

Hughes Aircraft Co., Culver City, Calif.
STUDY OF ADVANCED ANTENNA SYSTEMS PROBLEMS FOR SPACE VEHICLES.
Final rept. for 1 Apr 61-31 Dec 64,
by A. T. Villeneuve. Oct 64, 19p P-64-105
Contract AF19 604 8386, Proj. 4600, Task 460001
AFCRL 64 950

Unclassified report

Descriptors: (*Antennas, Spacecraft), Slot antennas, Waveguide slots, Data processing systems, Plasma sheath, Electromagnetic waves, Propagation, Diodes (Semiconductors), Tunnel diodes, Phase control devices, Phase shift, X band, S band, Radar targets, Varactor diodes, Nonlinear systems, Reports.

Summaries are presented of eight scientific reports covering several different problems investigated during a study of Advanced Systems Problems for Space Vehicles. Their titles are: (1) Multiple Target Response of Data Processing Antennas; (2) Radiation through Cylindrical Plasma Sheaths; (3) The Negative Conductance Slot Amplifier; (4) An Experimental Negative Conductance Slot Amplifier at 6 Gc; (5) A Waveguide Slot Switching Technique; (6) Admittance of Waveguide Radiating into Plasma Environment; (7) Radiation Patterns of Antennas on Plasma Enclosed Cylinders; and (8) Propagation of Electromagnetic Waves through Inhomogeneous Slabs. A study on the use of semi-conductor diodes for control of the amplitude and phase of radiation from waveguide slots is also reported. (Author)

AD-609 832 Div. 6, 4, 25
OTS Prices: HC $3.00/MF $0.75

Anti-Submarine Warfare Lab., Naval Air Development Center, Johnsville, Pa.
DEEXCITATION OF HELIUM ATOMS IN THE METASTABLE TRIPLET STATE (2-3s) IN PURE HELIUM.
Foundational research phase rept.,
by F. K. Elder, Jr., and W. F. Wintzer. 23 Dec 64, 61p
Task FR30 3 06
NADC AW 6428

Unclassified report

Descriptors: (*Magnetometers, Helium), (*Helium, Atomic energy levels), Line spectrum, Degradation, Atomic spectroscopy, Gas ionization, Atomic properties, Atomic orbitals, Bibliographies, Abstracting.

The processes whereby the functioning of metastable helium magnetometer may be deteriorated or destroyed by deexcitation of metastable triplet atoms are discussed, with particular attention to processes that take place even in very pure helium. Topics treated include relative effectiveness of destruction processes, species of colliding particles and types of collisions, and effects of cell dimensions and pressure on metastable destruction. (Deexcitation by impurities, and processes involving the rarer helium isotope of mass three, will be considered in subsequent reports.) A bibliography of the unclassified

periodical literature arranged alphabetically by author is included, giving titles and abstracts of articles, to provide a concise but relatively complete survey of the field. (Author)

AD-609 851 Div. 6, 2
OTS Prices: HC $2.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A LARGE APERTURE SEISMIC ARRAY.
Group rept.,
by P. E. Green, Jr. 6 Jan 65, 30p LL-1965-1
Contract AF19 628 500
ESD TDR65 26

Unclassified report

Descriptors: (*Seismology, Monitors), (*Monitors, Seismology), Earthquakes, Nuclear explosions, Underground explosions, Identification systems, Electronic recording systems, Telemeter systems, Site selection, Configuration, Microseisms, Seismic waves, Signal-to-noise ratio, Data processing systems, Detection.

The Large Aperture Seismic Array is an experimental system designed to provide improved capability for seismic discrimination of nuclear explosions and earthquakes. This improvement is to be brought about by suppression of reverberation and microseismic noise relative to the signal through the use of a larger number of sensors and a larger array aperture than previously employed in seismic arrays for this purpose. This report gives a brief sketch of the way in which the signal improvement is to be achieved, followed by a short physical description of the various parts of the entire array design as it is currently envisioned, including the choice of sensors, array geometry, signal telemetry, and signal processing. (Author)

7. Electrical Equipment

AD-609 504 Div. 7, 8
OTS Prices: HC $2.00/MF $0.50

Laboratory for Electroscience Research, New York Univ., N. Y.
ON THE REALIZATION OF BINARY SWITCHING FUNCTIONS WITH MAJORITY GATES,
by Manush Raship. 30 Sep 64, 38p NYU-TR-400-100
Grant AF AFOSR24 64 Unclassified report
AFOSR 64 2495

Descriptors: (*Switching circuits, Synthesis), (*Gates (Circuits), Switching circuits), (*Networks, Synthesis), (*Functions, Switching circuits), Circuits, Optimization, Binary arithmetic, Tables, Electrical engineering, Computer logic.

For switching circuit design with majority gates, an augmented function is derived that permits the residue test to determine which of the constants 0 and 1 as well as which of the literals of a binary switching function must appear as inputs in a realization. An approach to the realization of switching functions with majority gates based on having only these required literals and constants as inputs is shown to be useful. A synthesis procedure employing this approach is presented that yields an upper bound on the number of stages required. A table is derived of all switching functions which may be realized with a network composed of two stages of three-input majority gates. A single function type obtained from the table demonstrates, however, that an optimal realization (defined as that network having the fewest gates of those having the smallest number of stages) with one type of majority gate cannot always be found if inputs are restricted to be required literals and constants. (Author)

AD-609 505 Div. 7, 8, 30
OTS Prices: HC $2.00/MF $0.50

Laboratory for Electroscience Research, New York Univ., N. Y.
AN ALGEBRAIC-GEOMETRIC TECHNIQUE FOR THE REALIZATION OF SWITCHING FUNCTIONS WITH m-out-of-n DECISION GATES,
by Manush Raship. Oct 64, 40p NYU-TR-400-101
Grant AF AFOSR24 64
AFOSR 64 2496 Unclassified report

Descriptors: (*Functions, Switching circuits), (*Switching circuits, Synthesis), (*Gates (Circuits), Switching circuits), (*Networks, Synthesis), Optimization, Circuits, Algebra, Geometry, Binary arithmetic, Theorems, Computer logic, Electrical engineering.

An algebraic-geometric technique is presented for the realization of binary switching functions with networks composed of m-out-of-n decision gates. An m-out-of-n decision gate is defined as a device that may be described by a threshold function whose weights and threshold are positive integers. An expansion theorem is proved that can produce a variety of gate configurations ranging between the two extremes of 2(n-1) stages of 3-input majority gates, and a 2-stage form composed of gates having a much greater number of inputs. For realization with two stages, the terms of the expansion theorem may be mapped on to one-half of a Karnaugh diagram. The map displays all possible combinations of terms which may be combined according to the m-out-of-n decision logic, and provides a basis for formalizing the initial step in a reduction procedure. (Author)

AD-609 510 Div. 7, 26
OTS Prices: HC $1.00/MF $0.50

Assembly Products, Inc., Chesterland, Ohio.
PRODUCTION ENGINEERING MEASURE FOR METERS, TAUT-BAND SUSPENSION, A-C MOVING IRON VANE PER SIGNAL CORPS REQUIREMENTS SCS-160.
Quarterly progress rept. no. 6, 1 Aug-31 Oct 64,
by R. H. Nichols. 31 Oct 64, 10p
Contract DA36 039AMC01473E Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD 606 234.

Descriptors: (*Measuring devices (Electrical and Electronic), Production), Suspension devices, Voltmeters, Ammeters, Performance (Engineering), Test equipment, Test methods, Impact shock, Vibration, Temperature, Humidity, Photographic-analysis, Motion pictures, Military requirements, Manufacturing methods, Specifications, Design.

A group of six refined sample meters was constructed and tested. Wherever possible, parts from the pilot line tooling were used. Two meters were subjected to a high impact shock study made with high speed moving pictures. The movies proved to be a valuable aid. Other meters and components were spot checked for their ability to pass such tests as overload, temperature, humidity and vibration. The meters were tested to determine their capability of passing all test requirements. All tests in Group I (MIL-M-10304, 4.4.2.1) have been performed. Group II tests have been started and the Moisture Resistance test is in process. Isolated failures occurred in tests for response time, power consumption, extreme temperature, and overload capacity. Only the extreme temperature and overload failures indicate the need for more than minor attention. Superior performance was noted on temperature influence and repeatability tests of current meters. (Author)

AD-609 718 Div. 7, 4
OTS Prices: HC $1.00/MF $0.50

Rensselaer Polytechnic Inst., Troy, N. Y.
INVESTIGATION OF THE FUNDAMENTAL ELECTRO-CHEMICAL PARAMETERS INFLUENCING FUEL CELL PERFORMANCE.
Final rept.,
by N. D. Greene. 15 Sep 64, 8p
Contract AF19 604 8377, Proj. 6694, Task 669406
AFCRL 64 793 Unclassified report

Descriptors: (*Fuel cells, Electrochemistry), Energy conversion, Performance (Engineering), Electrodes, Polarization, Recording systems, Palladium, Hydrogen, Oxidation.

Several aspects of electrochemical energy conversion were investigated. A theoretical analysis of electrochemical energy conversion devices was developed and checked by experimental measurements. The results show that performance characteristics of a cell can be predicted from the polarization curves of the individual electrodes. The design and performance of a precise and versatile automatic polarization apparatus is described. This device records polarization results directly on semi-logarithmic paper. High current palladium-hydrogen diffusion electrodes can be achieved by oxidation pre-treatment. An equation for hydrogen diffusion in beta-palladium was determined. (Author)

AD-609 876 Div. 7, 4
OTS Prices: HC $1.00/MF $0.50

Calvin Coll., Grand Rapids, Mich.
LOW TEMPERATURE CYCLING BEHAVIOR OF THE SILVER ELECTRODE.
Technical rept. no. 3,
by Thedford P. Dirkse. 1 Nov 64, 13p
Contract Nonr168202, Proj. NR359 364 Unclassified report

Descriptors: (*Alkaline cells, Electrodes), (*Electrodes, Low-temperature research), (*Silver, Electrodes), Batteries and components, Cadmium, Electrical properties, Failure (Mechanics), Test methods, Electrochemistry.

Further work on the cycling characteristics of the silver electrode was carried out. (see AD-404 841). Emphasis was placed on the performance of the silver electrode at temperatures below freezing and the effect of current density on these characteristics. (Author)

8. Electronics and Electronic Equipment

AD-609 442 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Western Electric Co., Inc., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES 2N559-2N1094.
Quarterly progress rept. no. 27, 1 Jul-30 Sep 64,
by M. N. Reppert. 30 Sep 64, 42p
Contract DA36 039SC72729

Unclassified report

See also AD-606 681.

Descriptors: (*Semiconductor devices, Production), (*Transistors, Manufacturing methods), Machines, Machine tools, Bonding, Electric wire, Ultrasonic radiation, Capacitance, Voltage, Diffusion, Silanes, Coatings, Cleaning, Chemical milling, Infrared detectors, Reliability (Electronics), Guided missile components, Germanium, Silicon, Welding.

Progress is reported on the design and development of high-volume production equipment for use in the manufacture of semiconductor devices.

AD-609 445 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Elkridge, Md.
PRODUCTION ENGINEERING MEASURE: IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE RELIABILITY OF SILICON PLANAR EPITAXIAL; TRANSISTOR (WX-4001), LOGIC GATE (WM-201), FLIP-FLOP (WM-202), AC BINARY (WM-213).
Quarterly rept. no. 5, 1 Jul-30 Sep 64,
by A. T. Hamill. 30 Sep 64, 24p
Contract DA36 039AMC03617E

Unclassified report

See also AD-605 842.

Descriptors: (*Transistors, Manufacturing methods), Reliability (Electronics), Specifications, Quality control, Encapsulation, Integrated circuits, Diffusion, Photochemistry, Silicon alloys.

Extensive studies of assembly and lidding procedures were performed, and significant improvements in yield and reliability are expected as a result of changes in manufacturing procedures. During the period, a number of reliability tests were completed, and many additional tests were begun. Final drafts of the specifications for all devices were undertaken and are practically complete. An outline of the revised quality control manual was finalized. Quarterly samples were delivered per the contract requirements. The most important development during the period was the institution of automatic testing of all devices on the program, using an in-house designed and built automatic test system which automatically tests all DC parameters, prints out the data, and punches a tape which can be used for computer handling of the data. (Author)

AD-609 447 Div. 8
OTS Prices: HC $2.00/MF $0.50

Stanford Electronics Labs., Stanford Univ., Calif.
A FIXED-VOLTAGE POWER SUPPLY FOR TRANSISTOR CIRCUITS.
Technical note for Feb-Sep 63,
by David W. Howell. Aug 64, 33p SEL-64-096,
SEL-TR-1807-7
Contract AF33 657 11144, Proj. 4036, Task 403602
AL TR64 264

Unclassified report

Descriptors: (*Voltage regulators, Power supplies), (*Power supplies, Transistors), Electric currents, Circuits, Transformers, Germanium, Temperature, Specifications, Performance (Engineering).

Fixed-voltage regulated power supplies are described for use with transistor circuits. Specific circuits are described for regulators supplying 13 to 31 volts at currents up to one ampere. Circuit modifications are given which make the basic regulators useful for a wide range of applications. A procedure is developed for evaluating the performance of new regulators. (Author)

AD-609 461 Div. 8, 14, 25, 26
OTS Prices: HC $2.00/MF $0.50

RCA Labs., Div., Radio Corp. of America, Princeton, N. J.
COMPATIBLE ACTIVE THIN-FILM INTEGRATED STRUCTURES.
Final rept. for 15 Jun 63-31 Aug 64,
by C. W. Mueller, P. H. Robinson, E. P. Helpert, D. Meyerhoffer, and A. G. Revesz. Nov 64, 50p
Contract AF33 657 11398, Proj. 4159, Task 415905
AL TR64 291

Unclassified report

Descriptors: (*Silanes, Vapor plating), (*Semiconducting films, Silanes), (*Integrated circuits, Semiconducting films), Transistors, Silicon compounds, Single crystals, Sapphires, Electron diffraction analysis, Thin films (Storage devices), Resistors, Capacitors, Hall effect, Electron bombardment, Aluminum compounds, Gold alloys, Palladium alloys, Platinum alloys, Rhodium alloys, Pyrolysis, Oxides, Ceramic coatings.

A method was developed for depositing silicon films by the pyrolytic decomposition of SiH4 on single-crystal sapphire. Electron diffraction and Laue reflection examination of the films show single-crystal patterns. A Hall mobility of 135 sq. cm/volt-sec at a hole density of 10 to the 17th power/cu. cm was measured. Insulated-gate field-effect transistors with a transconductance of 1000 micro mho at 5 ma were made with dimensions of 10 micron source-to-drain spacing and an active distance of 120 microns. This value compares favorably with similar units made on bulk silicon and is very encouraging for the possibilities of thin-film silicon devices. A technique of evaporation was developed in which the source is a large silicon ingot heated by electron beam bombardment. P-type silicon films on sapphire were produced that gave a mobility of 145 sq. cm/volt-sec at a concentration of 9 x 10 to the 16th power/cu. cm. Electron diffraction patterns showed that portions of the film are single crystal. Successful devices could not be made on this material. Transistors were formed on small rectangles of silicon so that bonding connections can be made to metal over a sapphire substrate rather than over a thin oxide that may be readily damaged. (Author)

AD-609 463 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Piezo Crystal Co., Carlisle, Pa.
PEM QUARTZ CRYSTAL UNITS, FILTER LOW FREQUENCY, 1MC TO 10MC TYPES CR-(XM-49)/U THRU CR-(XM-52)/U.

Quarterly progress rept. no. 1, Jul-Sep 64,
by A. S. Matistic. 27 Nov 64, 34p
Contract DA36 039AMC03635E

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Crystal filters, Manufacturing methods), (*Quartz, Crystal filters), High frequency, Medium frequency, Crystal holders, Crystals, Specifications, Chemical milling, Bonding, Design.

The planoconvex design has been employed in fabricating crystal units for each of the 5 required sample frequencies: 1.75Mc, 5.0Mc, 6.0Mc, 7.5Mc and 10Mc. From 8 to 9 design variations were introduced at each of the 5 frequencies, representing a total of approximately 300 units. Averages for each design variation have been tabulated in terms of crystal parameter values C sub 1, R sub 0, R sub 1 and C sub 0; in addition, filter response curves have been recorded for all crystal units which were fabricated to completion although only 6 curves are included in the report. In a planoconvex versus flat-plate comparison, noncompatibility aspects are also included in the report.

AD-609 466 Div. 8, 5, 30
OTS Prices: HC $3.00/MF $0.75

International Business Machines Corp., Bethesda, Md.
ERROR CONTROL THROUGH CODING. VOLUME V. ANALYSIS AND COMPARISON OF ERROR CONTROL TECHNIQUES.
Final rept., vol. 5,
by R. J. Benice and A. H. Frey, Jr. Jul 64, 61p
Contract AF30 602 2958, Proj. 4519, Task 451903
RADC TDR64 149 V5

Unclassified report

Supersedes AD-607 526.
See also AD-609 472.

Descriptors: (*Coding, Errors), (*Errors, Control), (*Communication systems, Coding), Data transmission systems, Corrections, Computer logic, Mathematics, Communication theory, Reviews, Networks, Feedback.

Several retransmission logics are discussed and examined. Formulas are developed for the throughput rate R, which measures the proportion of the total bits transmitted that are actually new data, and the output error rate rho, which measures the proportion of the messages transmitted from the data source that are not received correctly at the data sink. These results are compared with each other and with standard forward error correcting codes for a wide range of hypothetical channels with independent and dependent error statistics.

AD-609 467 Div. 8, 5, 30
OTS Prices: HC $6.00/MF $1.25

International Business Machines Corp., Bethesda, Md.
ERROR CONTROL THROUGH CODING. VOLUME II. RECURRENT BURST-ERROR-CORRECTING CODES.
Final rept., vol. 2,
by C. V. Freiman, J. P. Robinson, and A. D. Wyner. Jul 64, 236p
Contract AF30 602 2958, Proj. 4519, Task 451903
RADC TDR64 149 V2

Unclassified report

Supersedes AD-607 583.
See also AD-609 471.

Descriptors: (*Coding, Errors), (*Errors, Control), (*Communication systems, Coding), Communication theory, Corrections, Redundant components, Signals, Sequences, Groups (Mathematics), Decoding.

An encoded recurrent-code message will usually consist of a sequence of blocks of b digits where each block contains m redundant or dependent digits and b-m information or independent digits. Unlike block codes, the values assumed by the redundant positions in a particular block no longer depend upon the information digits of that block alone but, in general, depend upon the information digits of N/m blocks where N is a multiple of m. The work is divided into four major catoegories: (i) lower bounds on the redundancy of recurrent codes; (ii) upper bounds on the redundancy of recurrent codes; (iii) comparison of block codes and recurrent codes; and (iv) error propagation in recurrent codes.

AD-609 468 Div. 8, 5, 30
OTS Prices: HC $2.00/MF $0.50

International Business Machines Corp., Bethesda, Md.
ERROR CONTROL THROUGH CODING. VOLUME VI. THE DESIGN OF ERROR CONTROL SYSTEMS.
Final rept., vol. 6,
by R. J. Benice and A. H. Frey, Jr. Jul 64, 29p
Contract AF30 602 2958, Proj. 4519, Task 451903
RADC TDR64 149 V6

Unclassified report

Supersedes AD-607 527.
See also AD-609 466.

Descriptors: (*Coding, Errors), (*Errors, Control), (*Communication systems, Coding), Corrections, Control systems, Design, Systems engineering, Handbooks, Communication theory, Optimization, Statistical analysis.

The report is presented in the format of a 'Handbook for Error Control Systems Design.' It is self contained and is designed for use by a systems engineer who may be completely unfamiliar with error control techniques. The handbook lists the required inputs and gives a flow chart, complete with formulas, to enable a computer to determine near optimum (with respect to cost) coding parameters if any coding parameters if any coding technique can be guaranteed to meet all of the requirements. The handbook is explained in detail. The formulas and procedures are explained and the validity of the procedures is established.

AD-609 470 Div. 8, 5, 30
OTS Prices: HC $3.00/MF $0.75

International Business Machines Corp., Bethesda, Md.
ERROR CONTROL THROUGH CODING. VOLUME III. VARIABLE REDUNDANCY CODES.
Final rept., vol. 3,
by R. T. Chien and D. T. Tang. Jul 64, 89p
Contract AF30 602 2958, Proj. 4519, Task 451903
RADC TDR64 149 V3

Unclassified report

Supersedes AD-907 524.
See also AD-609 467.

Descriptors: (*Coding, Errors), (*Errors, Control), (*Communication systems, Coding), Communication theory, Corrections, Redundant components, Computer logic, Wiring diagrams, Mathematical analysis, Decoding, Mathematics.

Contents: On the implementation of error correcting

codes, Dual codes variable redundancy codes, Cyclic product codes with variable redundancy, On variable length codes as variable, redundancy codes, On detecting errors after correction, Mode control in communications systems using variable redundancy codes, and Burst-error cyclic codes generated from cyclic groups.

AD-609 471 Div. 8, 5, 30
OTS Prices: HC $2.00/MF $0.50

International Business Machines Corp., Bethesda, Md.
ERROR CONTROL THROUGH CODING. VOLUME I. SUMMARY OF RESULTS.
Final rept., vol. 1, Mar 63-Mar 64.
Jul 64, 41p
Contract AF30 602 2958, Proj. 4519, Task 451903
RADC TDR64 149 V1

Unclassified report

Supersedes AD-607 523.

Descriptors: (*Coding, Errors), (*Errors, Control), (*Communication systems, Coding), Signals, Programming (Computers), Feedback, Statistical data, Data transmission systems, Computer logic, Mathematical analysis, System engineering, Optimization, Noise, Circuits, Corrections, Communication theory, Reviews.

The research was primarily devoted to the application of error control techniques. This discipline has developed a body of knowledge that can be extremely valuable to communication systems designers if criteria for the use of error control coding can be developed. The work included an analysis of channel statistics that leads to a computer program designed to choose an optimum error control technique from standard channel statistics and data transmission parameters. Variable length, variable redundancy codes and their applications were studied. Comparisons of block and recurrent codes were made; in addition a study was made of error propagation in recurrent codes. A cyclic decoding procedure for the familiar Bose-Chaudhuri-Hocquenghem code was developed. Comparisons were made between forward error correction codes and error detection codes with feedback and retransmission, with data throughput rate the criterion for comparison. Finally, a technique for combining error detection with message synchronization is described. (Author)

AD-609 472 Div. 8, 5, 30
OTS Prices: HC $3.00/MF $0.75

International Business Machines Corp., Bethesda, Md.
ERROR CONTROL THROUGH CODING. VOLUME IV. RESIDUE CODES.
Final rept., vol. 4,
by R. T. Chien. Jul 64, 80p
Contract AF30 602 2958, Proj. 4519, Task 451903
RADC TDR64 149 V4

Unclassified report

Supersedes AD-607 525.
See also AD-609 470.

Descriptors: (*Coding, Errors), (*Errors, Control), (*Communication systems, Coding), Corrections, Communication theory, Mathematics, Redundant components, Optimization, Instrumentation.

Contents: Residue codes for burst errors, Redundancy requirements in residue codes, Cyclic decoding procedure for Bose-Chaudhuri-Hocquenghem codes, A class of optimum residue codes for burst-error-correction, Cyclic residue codes for burst errors, Redundancy requirements in residue codes, A cyclic decoder for Bose-Chaudhuri-Hocquenghem codes, and On the instrumentation of Bose-Chaudhuri-Hocquenghem codes.

AD-609 473 Div. 8, 5, 30
OTS Prices: HC $3.00/MF $0.75

International Business Machines Corp., Bethesda, Md.
ERROR CONTROL THROUGH CODING. VOLUME VII. ADAPTIVE ERROR CONTROL SYSTEMS.
Final rept., vol. 7,
by F. P. Corr and A. H. Frey, Jr., Jul 64, 68p
Contract AF30 602 2958, Proj. 4519, Task 451903
RADC TDR64 149 V7

Unclassified report

Supersedes AD-607 437.
See also AD-609 468.

Descriptors: (*Coding, Errors), (*Errors, Control), (*Communication systems, Coding), (*Adaptive communication systems, Coding), Communication theory, Control systems, Design, Data transmission systems, Digital systems, Computer logic, Optimization, Simulation.

The principal conclusions drawn from this study are: (1) The design of a system, on a full-duplex link, capable of adapting block length can be achieved at moderate cost. (2) On the HF links tested the gains with this system were meager. It is anticipated, although not proven, that performance will be better on land lines. (3) For combating Rayleigh fading variable block length has more potential than single error correction with fixed block length; however, if feasible, variable bit rate offers still more in terms of average and low percentile efficiency. (Author)

AD-609 474 Div. 8, 5, 30
OTS Prices: HC $2.00/MF $0.50

International Business Machines Corp., Bethesda, Md.
ERROR CONTROL THROUGH CODING. VOLUME VIII. EXPERIMENTAL VERIFICATION AND OTHER STUDIES.
Final rept., vol. 8,
by F. P. Corr and A. H. Frey, Jr. Jul 64, 35p
Contract AF30 602 2958, Proj. 4519, Task 451903
RADC TDR64 149 V8

Unclassified report

Supersedes AD-607 438.
See also AD-609 473.

Descriptors: (*Coding, Errors), (*Errors, Control), (*Communication systems, Coding), Communication theory, Adaptive communication systems, Control systems, Performance (Engineering), Data transmission systems, Optimization, Polynomials, Design, Experimental data.

The volume contains the results of three investigations. The first of these, an experimental verification of the techniques used in the handbook of Volume 6 is described in Section 2. It described the gathering of error statistics, the data reduction, the selection of the optimum system and prediction of its performance, and the verification of the predicted performance. Section 3 contains a mathematical development showing the equivalence of block error rates as a function of n and the distribution of error-free intervals. In Section 4 a technique for combining error detection with message framing is described.

AD-609 475 Div. 8, 30
OTS Prices: HC $3.00/MF $0.75

Electro-Mechanics Co., Austin, Tex.
BRIDGED 'T' EXTENSION.
Final rept.,
by W. T. Flannery. Oct 64, 85p

Contract AF30 602 2969, Proj. 4540, Task 454001
RADC TDR64 316
Unclassified report

Descriptors: (*Radiofrequency filters, Microwave networks), (*Test equipment, Radiofrequency filters), (*Radiofrequency interference, Test equipment), Attenuation, Resonance, Capacitors, Ultrahigh frequency, Narrowband, Frequency modulation, Superhigh frequency, Cylindrical bodies, Military requirements, Partial differential equations.

A series of four tunable rejection networks having attenuations between 80 db and 100 db have been developed to cover the frequency range of 1 to 10 Gc. Right circular cylindrical cavities with appropriate tuning stubs are used to produce the same electrical characteristics as are found in a lumped parameter Bridged-T network. The main objectives of this study were to develop networks which would permit use on high power systems, have maximum attenuation at the rejection frequency and low insertion loss at all other frequencies. The principal use of these networks is for the measurement of small spurious signals in the presence of a large carrier signal, for the purpose of electromagnetic compatibility analysis. Various other methods and networks were evaluated during the study and it was concluded that the resonant cavity devices used in the equivalent Bridged-T configuration were superior. Models have been fabricated and tested and their performance characteristics are reported together with substantiating theoretical treatment. (Author)

AD-609 478 Div. 8
OTS Prices: HC $2.00/MF $0.50

Mitre Corp., Bedford, Mass.
THE EFFECTS OF MISMATCH AND DISTORTION ON THE OUTPUT SIGNAL OF A LINEAR FM PULSE-COMPRESSION FILTER,
by Manfred H. Ueberschaer. Dec 64, 33p
TM-04043/0000/00/0/00
Contract AF19 628 2390, Proj. 750
ESD TDR64 149
Unclassified report

Descriptors: (*Pulse compression, Filters (Electromagnetic wave)), (*Matched filters, Pulse compression), (*Electromagnetic waves, Phase distortion), Phase (Electronics), Signal-to-noise ratio, Targets, Velocity, Doppler effect, Radar signals, Algebra, Equations, Bessel functions.

The output functions of the pulse-compression filter which correspond to the matched filter case and the mismatched case are compared. Numerical comparison is made for two pulse-compression systems of particular interest. The primary effect of mismatch is found to be a reduction in signal-to-noise ratio which, in the worst case considered in this report, is less than 10 per cent. Deviations from the idealized rectangular amplitude spectrum and linear group delay of the transmitted signal, which was used in the previous analysis, are considered. These deviations, which are viewed as distortions, are chosen to provide a more realistic representation of the transmitted signal. The output signal thus obtained is expressed as the sum of the original term and a distortion term. An upper bound for the phase difference caused by the distortion term is obtained and is found to be negligibly small, even in the worst case considered. It therefore appears that the equations derived in the previous reports (and which were based on the idealized signal) need not be modified, and that the given procedure for relating the phase and delay measurements to the target parameters remains valid. (Author)

AD-609 491 Div. 8, 30
OTS Prices: HC $1.00/MF $0.50

Hughes Aircraft Co., Oceanside, Calif.
RESEARCH AND DEVELOPMENT OF TWO-COLOR DIRECT VIEW STORAGE TUBE WITH SELECTIVE ERASURE.
Interim development rept. for 1 Jul-1 Oct 64,
by P. P. Damon. Nov 64, 18p
Contract NObsr89452, Proj. SR00 80301, Task 9459
Unclassified report

See also AD-605 563.

Descriptors: (*Storage tubes, Color), (*Display systems, Storage tubes), Fluorescent screens, Brightness, Viewing screens, Electron tube parts, Electron guns, Resolution, Design, Performance (Engineering), Phosphorescence, Phosphorescent materials, Europium, Yttrium compounds, Vanadates, Information retrieval.

A direct view storage tube is being developed which is capable of displaying stored information in either of two colors or in intermediate hues, and selectively erasing that information. The operating principle is based on the fact that flood electrons which pass through holes in the storage mask when the storage-surface potential is near cutoff, fall within small areas on the viewing screen opposite the storage mask holes; whereas flood electrons which pass through the holes when the potential is near its maximum, (i.e., flood gun cathode potential), fall on larger overlapping areas of the viewing screen. The viewing screen consists of two phosphors. One occupies small areas in register with the storage-mask holes, while the other occupies areas surrounding the first. Included in this report are design and performance data on four ten-inch two-color tubes which were built during the report period. Three different phosphor dot patterns were evaluated in these tubes; two patterns consisted of a phosphor dot of one color in a field of a second color. Such patterns, with only one set of dots, simplify screening methods. Experiments were performed using a new phosphor: Sylvania europium activated yttrium vanadate. Tubes will be made using this phosphor. (Author)

AD-609 494 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Texas Instruments, Inc., Dallas.
LOW-NOISE L-BAND AMPLIFIER.
Quarterly progress rept. no. 1, 1 Jun-30 Aug 64,
by George D. Johnson, Grady E. Giles, and Leslie W. Read. 30 Aug 64, 55p TI-03-64-70
Contract DA28 043AMC00109E, Proj. 1G622001A05604
Unclassified report

Descriptors: (*Transistor amplifiers, L band), Printed circuits, Gain, Noise (Radio), Bandwidth, Electrical impedance, Admittance, Transformers, Germanium, Band-nass filters, Radiofrequency amplifiers, Coupling circuits, Design, Delay circuits.

Device characterization, circuit design, and stripline evaluation are topics presented. Developing satisfactory characterization techniques at microwave frequencies and providing data for amplifier design are objectives. -Circuit design: amplitude and phase requirements; maximum flat amplitude and time delay responses are discussed. Conclusion, overall response approximates a Butterworth Thompson characteristic with poles in intermediate positions between maximum flat amplitude and maximum flat time delay positions. -L-37 mesa and L-78 planar transistors were evaluated for power gain and stability in the 1.3 Gc region. Conclusion, only the common base configuration can provide adequate gain at this frequency. -Several stripline techniques are described, but a polyethyline dielectric with manually cut copper strips is preferable for experimental work. -Single and multiple stub filters have been developed for use as coupling and bandshaping networks in the amplifier. (Author)

AD-609 495 Div. 8
OTS Prices: HC $1.00/MF $0.50

Brown Univ., Providence, R. I.
A DIGITAL FERRITE PHASE SHIFTER. A STUDY OF THE DIFFERENTIAL PHASE SHIFT IN CIRCULAR CYLINDRICAL WAVEGUIDES CONTAINING CIRCUMFERENTIALLY MAGNETIZED FERRITE RODS AND TUBES UNDER TRANSVERSE ELECTRIC MODE EXCITATION,
by D. M. Bolle and G. S. Heller. Oct 64, 25p
Contracts SD86, AF19 628 2498, ARPA Order 157
Unclassified report

Descriptors: (*Phase shifter, Ferrites), Digital systems, Phase shift, Waveguides, Cylindrical bodies, Magnetic properties, Rods, Pipes, Phased arrays, Polarization, Theory, Electric fields, Functions, Propagation, Graphics.

AD-609 509 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Texas Instruments, Inc., Dallas.
OPTOELECTRONIC FUNCTIONAL ELECTRONIC BLOCKS.
Interim Engineering rept. no. 5, 1 Aug-31 Oct 64,
by J. R. Biard. 8 Dec 64, 78p TI-03-64-88
Contract AF33 657 11552
Unclassified report

See also: AD-604 888.

Descriptors: (*Semiconductor devices, Integrated circuits), (*Electron optics, Integrated circuits), (*Integrated circuits, Semiconductor devices), Optical glass, Coupling circuits, Adhesion, Bonding, Diodes (Semiconductor), Diffusion, Refractive index, Phototubes, Light transmission, Electroluminescence, Spectrum analyzers, Photoelectric effect, Voltage, Electric currents, Gallium alloys, Arsenic alloys, Zinc, Silicon.

Investigations of optoelectronic phenomena are being performed in an effort to extend the applicability of integrated circuits. The program has been divided into two tasks. Task I covered the design and fabrication of Optoelectronic Functional Electronic Blocks. Under Task I, Optoelectronic Pulse Amplifiers were designed and fabricated. The effort during this report period was applied to Task II, which is concerned with the development of semiconductor and measurement technology necessary to enhance the capabilities of Optoelectronic Functional Electronic Blocks. The technology and measurement investigations reported under Task II include: (1) A study of the problems associated with high-index glasses used as optical coupling media. (2) The description of a 'shaped' flat light source to improve optical coupling efficiency. (3) A study of diffusion process variables. (4) A study of dislocation density and its relationship to device behavior. (5) A description of some GaAs-GaAs sub (x) P sub (1-x) 'transparent' structures. (6) Transient photo-response measurements for room temperature and liquid nitrogen temperature. (7) A comparison of the optical and electrical characteristics of mesa and planar GaAs diodes. (8) A description of a light-spot scanning apparatus. (Author)

AD-609 521 Div. 8, 2
OTS Prices: HC $1.00/MF $0.50

Marine Lab., Univ. of Miami, Coral Gables, Fla.
A MODEL OF ATMOSPHERIC REFRACTIVITY AND THEORETICAL HEIGHTS OF RADIO-RADAR RAYS FOR MIAMI, FLORIDA,
by Harold P. Gerrish. 1964, 6p
Contract DA36 039sc89111
Unclassified report

Pub. in Proceedings 1964 World Conference on Radio Meteorology, Boulder, Colo., 14-18 Sep 64, p. 56-61.

Descriptors: (*Atmospheric refraction, Radio waves), (*Atmosphere models, Refraction), (*Radio waves, Atmospheric refraction), Refractive index, Climatology, Moisture, Radiosondes, Atmospheric sounding, Boundary layer, Diurnal variations, Equations, Radar signals, Wave transmission, Propagation, Florida.

The purpose of this work is to start from typical seasonal profiles of atmospheric conditions for Miami, Florida, and step by step develop a model of atmospheric refractivity which is satisfactory for such a warm, moist climate. Theoretical ray paths are traced through this type of atmosphere at various antenna elevations and are summarized in the form of range-height charts. Height anomalies from the standard atmosphere using the 4/3-earth-curvature assumption are also illustrated.

AD-609 522 Div. 8, 25, 26
OTS Prices: HC $2.00/MF $0.50

Western Electric Co., Inc., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES, 2N560, 2N1051, 2N1072, 2N1195, 1N664, 1N665, 1N666, 1N667, 1N668, 1N669, 1N673, 1N675, 1N697 and 1N701.
Quarterly progress rept. no. 20, 1 Jul-30 Sep 64,
by M. N. Reppert. 30 Sep 64, 42p
Contract DA36 039SC81294
Unclassified report

See also AD-606 145.

Descriptors: (*Semiconductor devices, Production), (*Transistors, Production), (*Diodes (Semiconductor), Production), Industrial production, Machines, Guided missile components, Manufacturing methods, Test equipment (Electronics), Test methods, Welding.

AD-609 563 Div. 8, 26
OTS Prices: HC $4.00/MF $1.00

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE ON HIGH PERVEANCE CATHODE-RAY TUBES.
Final technical rept. for 8 Jun 61-8 Dec 64,
by Edward T. Rate. 8 Dec 64, 118p
Contract DA36 039SC85965
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also: AD-609 193.

Descriptors: (*Cathode ray tubes, Production), Modulation, Electron guns, Ion bombardment, Field emission, Capacitance, Brightness, Life expectancy, Test methods, Manufacturing methods, Specifications, Mechanical drawings.

This Production Engineering Measure was designed to provide a capability for the limited production of Focus Reflex Modulation Cathode-Ray Tubes. A summation is reported of the work accomplished in providing an adequate facility, trained personnel, and manufacturing instructions. (Author)

AD-609 572 Div. 8
OTS Prices: HC $3.00/MF $0.75

Radio Corp. of America, Harrison, N. J.
A LOW-NOISE, MULTIPLE-FUNCTION, X-BAND TRAVELING-WAVE TUBE.
Interim development rept. no. 9, 1 May-1 Oct 64, by G. Hodowanec. 1 Nov 64, 60p
Contract NObsr87535, Proj. SR008 03 04, Task 9293
Unclassified report

Descriptors: (*Traveling-wave tubes, Microwave amplifiers), Feasibility studies, Demodulators, Video amplifiers, X band, Electron guns, Performance (Engineering), Specifications, Noise (Radio), Helixes, Focusing, Magnets, Video signals, Crossed field devices, Ceramic materials.

This report describes the work done during the feasibility phase of a program to develop a low-noise, X-band traveling-wave tube capable of operating simultaneously as (1) a low-level linear output amplifier, (2) a high-level limited output amplifier, and (3) a high-output video detector. The tube developed in this program was essentially a tube that could be tested and was designed to be amenable to many design changes. This approach enabled a thorough evaluation program with a minimum number of 'bottle' starts. The work, reported in detail in this report, demonstrates the feasibility of the design approaches which were used to produce the desired tube. Two interim and three prototype tubes were delivered during this phase of the program. Data on the prototype tubes are given in the appendix to this report. Summaries of experimental results and conclusions are given throughout the body of the report. These data indicate that the performance of the multiple-function tube has indeed been demonstrated and that the desired tube design is highly feasible. The report ends with recommendations that are based on the conclusions given in the text.

AD-609 594 Div. 8, 2, 30
OTS Prices: HC $4.00/MF $1.00

Aerospace Corp., Los Angeles, Calif.
ELECTRONICS RESEARCH PROGRAM. RESEARCH AND EXPERIMENTATION ON SPACE APPLICATIONS OF MILLIMETER WAVES.
Semiannual technical note for 1 Jul-31 Dec 62, by J. Stacey. 21 May 63, 132p TDR-169(3250-41)TN-1
Contract AF04 695 169
SSD TDR63 48
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electronics, Research program administration), (*Radio astronomy, Millimeter waves), (*Millimeter waves, Radio astronomy), Antennas, Instrumentation, Attitude control systems, Boresighting, Astronomical observatories, Attenuation, Propagation, Atmosphere, Radiometers, Radomes, Galaxies, Moon, Sun, Planets, Data processing systems.

Progress is reported in the planning and development of a millimeter wave observatory. A description of the instrumentation is given, and the observational goals are outlined. A technical description is given of the antenna, the type of mounting, the attitude control system, and the boresighting problems. The observatory is scheduled to conduct a research activity into the millimeter wave region. An initial operating wavelength of 3.2 millimeters is planned with a growth capability extending to 1.2 millimeters. (Author)

AD-609 596 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Crystalonics, Inc., Cambridge, Mass.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND TO INSURE THE RELIABILITY OF THE C600 SERIES FIELD EFFECT TRANSISTORS.
Quarterly rept. no. 5, 1 Jul-30 Sep 64, by John R. Williams. 30 Sep 64, 26p
Contract DA36 039AMC01483E
Unclassified report

See also: AD-606 477.

Descriptors: (*Transistors, Manufacturing methods), (*Reliability (Electronics), Transistors), Bonding, Dies, Industrial production, Etched crystals, Test equipment (Electronics), Failure (Mechanics), Life expectancy, Printed circuits, Power supplies, Voltage, Boron, Packaging, Quality control, Data processing systems.

The purpose of this program is to improve the reliability of the C600 series field effect transistors by specific improvements of manufacturing techniques. The basic program has been outlined in a PERT plan which is being used as a reference. In an effort to achieve the failure rate objective, the following improvements were incorporated into the production process: (1) Oxidation of slices; (2) Boron diffusion of slices; (3) Mask alignment; (4) Etching of slices; (5) Die-to-header bonding; (6) Wire bonding; and (7) Packaging. (Author)

AD-609 602 Div. 8, 14, 26
OTS Prices: HC $2.00/MF $0.50

International Resistance Co., Philadelphia, Pa.
PRODUCTION ENGINEERING MEASURES FOR HIGH RELIABILITY, FIXED, FILM, PRECISION RESISTORS.
Quarterly progress rept. no. 7, 1 Jul-30 Sep 64, by Richard C. Wagner. 30 Sep 64, 29p
Contract DA36 039AMC01461E
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also: AD-606 954.

Descriptors: (*Fixed resistors, Metal films), (*Resistors, Manufacturing methods), Failure (Mechanics), Industrial production, Quality control, Reliability (Electronics), Hermetic seals, Glass seals, Fracture (Mechanics), Cleaning, Resistance (Electrical), Statistical data, Tests, Tolerances (Mechanics).

A revised batch evaluation procedure was adopted. Accumulation of data during the seventh quarterly report period has confirmed the effectiveness of the procedure for evaluating evaporated material before releasing it for manufacturing. An evaluation of lead assembly strength was made. Statistical information is presented to show that the lead strength exceeds more than four times the amount required for in-process tests. Inspection methods were improved by determining that greater accuracy and efficiency are obtained when a comparator is substituted for a graduated eye loupe. Correlation exists between the glass bead crack rate at sealing and the length of time for cleaning the lead prior to gold plating. The design of the binner is complete and has been sent out for quotation. The automatic spiraller is in the final design stage. Design of the sequential sealer has been started. Sample parts have been sent to a vendor who will propose a modified design

of commercial capping equipment. Additional pulse adjustment tests were conducted on GEM resistors. The temperature coefficient of the part is not affected by pulsing but like the XLT, erratic behavior is observed during pulsing. A technique however, was developed for pulsing to ±.1% tolerance. (Author)

AD-609 616 Div. 8, 5, 12
OTS Prices: HC $5.00/MF $1.25

Stanford Research Inst., Menlo Park, Calif.
DESIGN APPROACHES FOR SATELLITE ANTENNAS.
Final rept., task 1,
by J. A. Martin. Feb 62, 191p
Contract AF04 647 483, Proj. 3854, Task CBA C95
N63 14955
Unclassified report

Descriptors: (*Satellite antennas, Systems engineering), (*Antennas, Communication satellites (Active)), (*Communication satellites (Active), Antennas), Satellites (Artificial), Space communication systems, Radio relay systems, Time-delay relays, Antenna configurations, Antenna radiation patterns, Orbital trajectories, Design, Costs, Mathematical analysis, Electronics, Communication systems.

This report is concerned with antennas for active earth satellite communication relays. Both earth-satellite and satellite-satellite communication links, as well as both instantaneous and delayed retransmission, are considered. The objective of this report is not to describe specific antennas; rather it is to provide analytical procedures, mathematical formulas, and data for establishing the antenna specifications for specific applications and for estimating the abilities of various antennas to meet the specifications. A major part of the report is devoted to describing in some detail the many system considerations, such as system functions, satellite-earth geometry, antenna pattern coverage, and environment, from which the antenna requirements are derived. A second major part deals with basic antenna parameters that are involved in selecting, evaluating, or developing satellite antennas. Data and curves show effects of trade-offs between electrical characteristics or between electrical and physical characteristics. Some antennas being developed for current satellites are described; and some areas needing further research are pointed out. (Author)

AD-609 623 Div. 8, 14, 26
OTS Prices: HC $4.00/MF $0.75

International Resistance Co., Philadelphia, Pa.
PRECISION VOLUME RESISTOR.
Final development rept. for 18 Jun 63-18 Dec 64,
by C. Huang and K. M. Merz. 18 Dec 64, 118p
Contract NObsr89439, Proj. SR008030, Task 9598
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-606 707.

Descriptors: (*Resistors, Manufacturing methods), (*Composite materials, Resistors), Carbon, Ceramic materials, Palladium, Resistance (Electrical), Performance (Engineering), Inorganic compounds, Reliability (Electronics), Powder metals, Silver, Nickel, Copper, Plating, Aluminum compounds, Oxides, Chromium compounds, Vanadium compounds, Physical properties, Environmental tests.

An investigation was made of materials and fabricating techniques capable of producing a precision volumetric resistor composed of inorganic materials. Performance results indicated these resistors are stable to voltage, temperature, moisture and other test environments. The high temperature deposition of carbon into a porous ceramic has been found to produce resistors with excellent properties. This method however, is useful for only very low range resistors (2.7 ohms to 50 ohms) because it results in a large negative temperature coefficient of resistance when it is used to produce high resistance values. Resistors based on palladium dispersed in a ceramic matrix have been found to be satisfactory and cover the resistance range of 100 ohms to 100,000 ohms.

AD-609 625 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Microwave Associates, Inc., Burlington, Mass.
RESEARCH ON MILLIMETER-WAVE GENERATION TECHNIQUES.
Final rept. for 1 Apr 63-1 Apr 64,
24 Nov 64, 99p
Contract AF33 657 10925, Proj. 4460, Task 446001
AL TR64 270
Unclassified report

Descriptors: (*Millimeter waves, Oscillators), (*Microwave oscillators, Semiconductor devices), (*Oscillators, Millimeter waves), (*Semiconductor devices, Microwave oscillator), Radiofrequency oscillators, Electron optics, Semiconductors, Gallium alloys, Arsenic alloys, Injection, Lasers, Detectors, Quantum mechanics, Solid state physics, Manufacturing methods, Traveling-wave tubes, Oscilloscopes, Ultra-high frequency, L band.

The objective of this work was to determine the materials and techniques necessary to provide direct coherent millimeter-wave energy generation by solid-state means other than harmonic generation or masers. Two programs were initiated; Task I, millimeter-wave generation using the electro-optical approach; Task II, the obtaining of microwave oscillations in bulk gallium arsenide material by d-c pulses. In the electro-optical approach to the generation of millimeter-wave energy (Task I) using semiconductors, a light source and a detector is required. In this program a detector is developed. A PIN heterojunction structure was designed for optimum quantum efficiency, maximum operating frequency and a spectral response consistent with potential light sources. In a separate approach to the generation of millimeter-wave energy (Task II) microwave oscillations have been observed in bulk GaAs during the application of short video pulses. The oscillations were observed on a travelling-wave oscilloscope and frequencies were found to be in the UHF and L-band range.

AD-609 626 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Radio Corp. of America, Somerville, N. J.
DEVELOPMENT OF A UHF POWER TRANSISTOR.
Quarterly rept. no. 1. 1 Jul-30 Sep 64,
by E. F. Breniak. 30 Sep 64, 10p
Contract DA49 168AMC118D
Unclassified report

Descriptors: (*Transistors, Radiofrequency oscillators), Ultrahigh frequency, Reliability (Electronics), Shock resistance, Life expectancy, Storage, Failure (Mechanics), Gold, Bonding, Circuits, Aluminum, Electric wire, Radiofrequency power, Stresses, Costs.

The main effort was directed toward cost reduction. Additional work was done in the areas of device design,

reliability testing and device applications. The device design was modified to incorporate: smaller pellets (50 mils to 30 mils), the use of a special TO-5 package and aluminum lead wires. In the area of reliability testing, storage life tests at 80C and 95 percent relative humidity, 150C and 200C were initiated. Test results are not yet available. The design of two 500mc oscillator test circuits was completed.

AD-609 638 Div. 8, 9, 25
OTS Prices: HC $1.00/MF $0.50

Avco-Everett Research Lab., Everett, Mass.
THE DIOCOTRON INSTABILITY IN A CYLINDRICAL GEOMETRY,
by R. H. Levy. Dec 64, 21p Avco-RR-202
Contracts NASw1101, AF49 638 659, Proj. 9752, Task 9752 01

Unclassified report

Descriptors: (*Electron beams, Stability), (*Magnetohydrodynamics, Electron beams), (*Crossed field devices, Electron beams), (*Cylindrical bodies, Crossed field devices), Particle beams, Perturbation theory, Field theory, Plasma medium, Magnetrons, Fluid flow, Incompressible flow, Vortices, Two-dimensional flow, Propagation, Electromagnetic waves, Microwave devices, Electrons, Covette flow.

The diocotron (or slipping stream) instability of low density electron beams in crossed fields is considered for a cylindrical geometry. For a simple density distribution, the normal modes of the electron beam correspond to a continuum of eigenvalues, plus two discrete eigenvalues. Work due to Case and Dikii appears to show that the continuous spectrum is not important in stability studies of this type. The condition for stability considering the discrete modes only is derived; under suitable geometrical and electrical conditions, it is shown that these modes can be stable. The analogy between the electromagnetic problem considered here and the problem of the stability of an ideal rotating fluid is discussed. It is shown that stability conditions derived for the latter problem depend on the possibility of axial perturbations; what this implies for the electron beam problem is briefly discussed. (Author)

AD-609 639 Div. 8, 14, 26
OTS Prices: HC $1.00/MF $0.50

Cornell-Dubilier Electric Corp., New Bedford, Mass.
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200C.
Quarterly rept. no. 14,
by Paul C. Ricard. 27 Oct 64, 10p
Contract DA36 039sc85955

Unclassified report

See also AD-605 753.

Descriptors: (*Capacitors, Manufacturing methods), (*Ceramic capacitors, Fluorination), (*Barium compounds, Titanates), Disks, Encapsulation, Glass, Miniature electronic equipment, Dielectrics.

Ceramic capacitors, MIL style CK63, capable of operating at 200C, were manufactured from a fluorinated dielectric of which $BaTiO_3$ was the predominant material, 87%, other materials being $CaZrO_3$, 12.7%; Fe_2O_3, 0.1%; and Ce_2O_3, 0.2%. A low voltage, miniaturized, fluorinated capacitor, having a thin dielectric of the same composition as the CK63 capacitors, was also manufactured for 200C operation. Fluorination of a dielectric was accomplished by re-firing the matured dielectric in a fluoride atmosphere.

AD-609 655 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Rome Air Development Center, Griffiss AFB, N. Y.
FAST HIGH POWER MICROWAVE SWITCHES. A SURVEY,
by Vincent C. Vannicola. Nov 64, 22p
Proj. 4506
RADC TDR64 70

Unclassified report

Descriptors: (*Microwave equipment, Electronic switches), (*Electronic switches, Microwave equipment), Resolution, Pulse compression, Radiation weapons, Signals, Bandwidth, Radiofrequency power, Electron beams, Waveguide switches, Thyratrons, Cyclotrons, Ferrites, Phase shift, Electric fields, Magnetic fields, Lasers.

Developments in microwave tube technology are rapidly providing power generating capabilities of increased orders of magnitude. Applications for these power levels find their way into microwave systems associated with long range high resolution surveillance, pulse compression, plasma diagnostics, and radiation weaponry. For such applications, it is often necessary to switch the direction of high levels of microwave power in extremely short time intervals. This report discusses most of the switching techniques currently under development which are potentially adaptable for fast switching of high power microwave signals. Comparisons are made with respect to peak power, switching speeds, losses, isolation, external operating power, degree of complexity, and bandwidth. (Author)

AD-609 658 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
EFFECT OF MAGNETIC FIELDS ON MICROWAVE GAS-DISCHARGE DUPLEXER CHARACTERISTICS,
Technical rept.,
by Robert M. True and Edward V. Edwards. Sep 64, 49p
Proj. 1P6 22001A055 04 02
USAEL ECOM2516

Unclassified report

Descriptors: (*Magnetic fields, Gas discharges), (*Gas discharges, Magnetic fields), (*Electron tubes, Gas discharges), Microwaves, Particles, Diffusion, Electric fields, Dielectrics, Helium, Neon, Electrons, Crossed field devices, Plasma sheath, Temperature, Pressure, Gas ionization, Magnetohydrodynamics, Plasma medium.

An experimental investigation has been made to determine some of the effects of a confining magnetic field on a gaseous plasma within a duplexing device. Both the parallel and crossed E and H field configurations were examined using a helium and a helium-neon Penning mixture gas fill. Temperature measurements indicate that magnetic confinement can lower the rf window temperature of a gaseous discharge duplexing device by more than 50% at pressures below 0.5 torr. Leakage power can also be reduced by 50% or more in this pressure range, but the leakage level in the parallel field device is inherently too high for practical application. Reductions of up to 4.5 to 1 were obtained in the recovery time of helium in the 2 to 50 torr pressure range using a crossed-field configuration. By magnetically confining the plasma discharge of a gaseous duplexer, the performance can be significantly improved by lowering temperatures and gas clean-up rates. (Author)

AD-609 661 Div. 8, 25, 26
OTS Prices: HC $1.00/MF $0.50

Sperry Microwave Electronics Co., Clearwater, Fla.
PRODUCTION ENGINEERING MEASURE. YIG SPHERES AND LIMITERS.
Quarterly progress rept. no. 5, 29 May-29 Aug 64, by J. E. Andrews, L. R. Hodges, Jr., and D. E. Tribby. 29 Aug 64, 17p SJ222-0045-5
Contract DA36 039AMC01477E

Unclassified report

See also AD-603 507.

Descriptors: (*Ferroelectric crystals, Manufacturing methods), (*Limiters, Manufacturing methods), (*Spheres, Single crystals), (*Single crystals, Crystal growth), Polishes, Surface properties, Yttrium, Iron, Garnet, Encapsulation, Gallium.

A new method of casting abrasive rings for the tunnel air races has been devised, resulting in greater productivity and reduced down time. The new sphere encapsulation and alignment process has been fully developed and tested. This process yields greater speed and accuracy, resulting in an increased production capability. The second delivery of limiter engineering samples was shipped during this reporting period. Design goal characteristics were not accomplished in all units. Machined and purchased parts are being prepared for the fabrication of the preproduction units. Test specifications and procedures are being drawn up for use in testing these units. YIG material has been fired to demonstrate reproducibility and to study the distribution of magnetization values in gallium substituted material. Satisfactory results were indicated in both cases. (Author)

AD-609 674 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Northeastern Univ., Boston, Mass.
INVESTIGATION OF SOLID STATE DEVICES AND CIRCUITS.
Final rept. for 1 May 60-30 Sep 64, ed. by Basil L. Cochrun. 30 Sep 64, 20p
Contract AF19 604 7271, Proj. 5621, Task 562103
AFCRL 64 902

Unclassified report

Descriptors: (*Semiconductor devices, Tunnel diodes), (*Tunnel diodes, Circuits), Linear systems, Amplifiers, Oscillators, Negative resistance circuits, Thin films (Storage devices), Transistors, Lasers, Electromagnetic pulses, Solid state physics.

The report is concerned with the development of tunnel diode circuitry and an experimental and theoretical investigation of semi-conductor devices and characteristics. The application of tunnel diodes to linear circuits such as amplifiers, oscillators and negative resistance filters was investigated. Consideration was also given to their use in pulse circuits. Studies of the properties of conventional and unconventional junctions were made. Special semiconductor devices were fabricated and evaluated. Such devices include thin film tunnel triodes and a unipolar field effect transistor. (Author)

AD-609 675 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.
SOLID-STATE GENERATOR.
Quarterly progress rept. no. 6, 1 Sep-30 Nov 64, by Ernst F. Scherer. 30 Nov 64, 20p
Contract NObsr89356, Proj. SR008 03 31, Task 9391

Unclassified report

See also AD-606 088.

Descriptors: (*Radiofrequency generators, Semiconductor devices), (*Semiconductor devices, Radiofrequency generators), Frequency multipliers, Power amplifiers, Transistors, Radiofrequency power, Circuits, Radiofrequency oscillators, Diodes (Semiconductor), Broadband, Design, Performance (Engineering).

The following tasks concerning the Solid-State RF Generator were investigated: (A) The Redesign of the Power Amplifier and Oscillator; (B) The Redesign of the First Multiplier Stage; and (C) Testing and Finalizing of the Prototype Signal Source. These areas, involving the development of the Solid-State RF Generator, have been carefully evaluated and a summary of that work, to date, is included in this report. (Author)

AD-609 679 Div. 8, 30
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
DIGITAL COMPUTER STUDIES OF ELECTRON GUNS.
Interim rept.,
by R. T. Close. 30 Nov 64, 14p
Proj. RR002 01 41 4904
NRL 6174

Unclassified report

Descriptors: (*Particle trajectories, Electron guns), (*Electron guns, Programming (Computers), Digital computers, Electrodes, Electron beams, Voltage, Klystrons, Numerical analysis, Partial differential equations, Theory, Electrons.

A digital computer program is being used to solve the electron gun problem to a certain degree of approximation. Certain phenomena have been observed in the numerical solution such as the choice of the perveance density influencing the convergence and final results. These phenomena are not completely understood; however, experience has provided guidelines to effective use of the program. The program was used to evaluate two electron guns of current interest to the Sozotron project, namely, the Litton L-3250 and L-232 guns. It was found that both guns appear to be suitable for this application. (Author)

AD-609 686 Div. 8, 14, 17, 26
OTS Prices: HC $2.00/MF $0.50

Beryllium Corp., Reading, Pa.
PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
Quarterly progress rept. no. 4, 1 Apr-31 Jul 64, by J. F. Blum and J. N. Wambold. 31 Jul 64, 38p
Contract DA36 039AMC01481E

Unclassified report

See also AD-605 182.

Descriptors: (*Ceramic materials, Electronic equipment), (*Beryllium compounds, Oxides), (*Electronic equipment, Ceramic materials), (*Powder metallurgy, Mechanical working), Powders, Ores (Metal sources), Extrusion, Bonding, Binders, Starches, Material forming, Sintering, Heat treatment, Seals (Stoppers), Tensile properties, Mixtures, Molybdenum alloys, Manganese alloys, Dielectric properties, Density.

Development work has shown that powder varies throughout a large calcination bed. The 'tops' are more sinterable and have a finer particle size distribution than do the 'bottoms'. It was shown that a very uniform powder was obtained from batch to batch in large calcination beds when the total powder from each run was blended to obtain a composite powder for each run. Precompaction was evaluated as a method to increase powder bulk density for better fill and flow properties. The precompacted powder was far superior to the 'normal' powder with respect to these characteristics. However, some preliminary data indicate that the dielectric strength of parts prepared from powder previously precompacted at high pressure (18,000 psi) may be adversely effected. Extrusion development has shown that water soluble starches can replace floc-gel starch as a binder. Some control problems have been evaluated. (Author)

AD-609 700 Div. 8
OTS Prices: HC $1.00/MF $0.50

Coordinated Science Lab., Univ. of Illinois, Urbana.
STATE MODELS OF ACTIVE RLC NETWORKS,
by Ahmet Dervisoglu. Dec 64, 15p CSL-R-237
Contract DA28 043AMC00073E
Unclassified report

Research partly supported by the Office of Naval Research and the Air Force Office of Scientific Research.

Descriptors: (*Electrical networks, Mathematical models), Circuits, Topology, Vector analysis, Matrix algebra, Algebra, Theorems, Transformers.

In active RLC networks in which dependent sources are controlled by passive elements, the existence of a tree which contains all voltage sources as branches and all current sources as chords is only a necessary condition for a unique solution. Unlike the passive case, the order of state vector depends not only on the topology of the network but also on the controlling coefficients of the dependent sources in the network. Furthermore, in passive case if state variables are the currents of inductors and voltages of capacitors, at most the first derivative of the input vector u may appear in the state model but in active case the nth derivative may appear, where n is the number of reactive elements in the network.

AD-609 705 Div. 8
OTS Prices: HC $1.00/MF $0.50

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
Final summary rept. for 1 May 61-30 Sep 64,
by S. Amarel, K. R. Kaplan, S. Y. Levy, C. V. Srinivasan, and R. O. Winder. 30 Oct 64, 23p
Contract AF19 604 8423, Proj. 5632, Task 563202
AFCRL 64 894
Unclassified report

See also AD-414 512.

Descriptors: (*Switching circuits, Theory), (*Electrical networks, Gates (Circuits)), (*Reliability (Electronics), Switching circuits), Artificial intelligence, Bionics, Computer logic, Errors, Corrections, Redundant components, Linear programming, Game theory, Feedback, Recursive functions, Reports.

A final summary report is presented on the work done over three and one-half years. The work includes (1) threshold logic--a broad treatment of various topics in the switching theory of the threshold gate, and (2) the reliability of switching networks, including triangular recursion, active error-correction, and redundancy coding. This report summarizes and analyzes the results attained, giving specific references to the earlier reports issued under the contract and to related published work. Lists of the contract reports, publications, and lectures and seminars are included. (Author)

AD-609 707 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Mallory (P. R.) and Co., Inc., Indianapolis, Ind.
PRODUCTION ENGINEERING MEASURE FOR IMPROVED RELIABILITY OF SOLID ELECTROLYTE TANTALUM CAPACITORS.
Quarterly rept. no. 5, 30 Jun-29 Sep 64,
by A. W. H. Smith. 29 Sep 64, 17p
Contract DA36 039AMC03623E
Unclassified report

See also: AD-604 988.

Descriptors: (*Tantalum capacitors, Manufacturing methods), Production, Reliability (Electronics), Welding, Sintering, Impregnation, Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Powder metals, Soldering, Metal coatings, Quality control, Life expectancy, Environmental tests, Failure (Mechanics), Manganese compounds, Dioxides, Specifications, Performance (Engineering).

Work was completed on the following tasks: welding, quality control of welding, quality control of anodization and reformation, and quality control of metallic cathode connection. The laboratory phase of presintering was completed and work begun in the factory. Laboratory studies of sintering were initiated. Work on Manganese Dioxide deposition and soldering continued in the factory. Processing and materials specifications were begun, and a Process Inspection Point Control System was established. (Author)

AD-609 716 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

Systems, Inc., Orlando, Fla.
PEM FOR FILTERS, UPPER SIDEBAND (1.75 MC.) QUARTZ CRYSTALS TYPE EL-FR (X-1).
Quarterly progress rept. no. 1, 30 Jun-30 Sep 64.
30 Sep 64, 53p
Contract DA36 039AMC03636E
Unclassified report

Descriptors: (*Crystal filters, Manufacturing methods), (*Radiofrequency filters, Manufacturing methods), (*Quartz, Radiofrequency filters), Resonators, Capacitance, Frequency, Crystal holders, Band-pass filters, Crystal lattices, Design, Synthesis, Programming (Computers).

The capability is to be established of manufacturing upper-sideband (1.75-mc) quartz crystal filters of the type EL-FR (X-) that is designed to provide upper-sideband selection in equipment such as the AN/GRC-106. The filter 2-db bandwidth is about 3.2 kc., with carrier frequency rejection of at least 30 db and lower sideband rejection of at least 60 db. The technical requirement is specification SCS-207 which references SCL-7755. The designs considered include an 18 crystal-3 section filter, a 10 crystal-2 section filter, and a 12 crystal-6 section filter. The basis of the type I, 18-crystal design was 'Crystal Filters,' the Final Report of Motorola, Inc., Chicago, on Contract DA-36-039-SC-85300, Aug. 15, 1963. The design of the type III, 12-crystal design, was

verified experimentally; it was based on the report of Smythe, 'The Synthesis of Crystal-Capacitor Tandem Lattice All-Pole Bandpass Filters on the Insertion Loss Basis,' Proceedings of the 18th Annual Symposium on Frequency Control, USAEL, Ft. Monmouth, N. J., May 1964. Types I and III were estimated to provide better performance with less cost than type II, the 10-crystal design of Hughes Aircraft Co., 'SSB and VHF Crystal Filters,' 3d quarterly report of Contract DA-36-039-AMC-02305(E), using an image parameter design described by Storch as the type NB filter in 1957, Hughes, 'High Frequency Crystal Filters,' 2d quarterly report on Contract DA-36-SC-73070 (PB-146 564).

AD-609 717 Div. 8, 9, 30
OTS Prices: HC $3.00/MF $0.75

DECO Electronics, Inc., Boulder, Colo.
DYNAMIC ELECTRICAL MODELING OF ELECTRODES MOVING IN SEA WATER.
Interim rept.,
by L. Ball. Oct 64, 61p DECO-30-P-7
Contract Nonr338700, Proj. NR371 590
Unclassified report

Descriptors: (*Electrodes, Models (Simulations)), (*Dipole antennas, Underwater), (*Underwater equipment, Dipole antennas), Model tests, Fluid dynamic properties, Electrical properties, Simulators, Corrosion, Turbulence, Materials, Electromagnetic shielding, Correlation techniques, Sea water.

This study has direct application to the design of submerged dipole antennas. The hypothetical laboratory modeling system consists of a closed circuit water tunnel capable of simulating the electrodynamic and hydrodynamic properties of water at speeds up to 20 knots. Electrical noise quieting is achieved by shielding and correlation techniques. Only the test section of the water tunnel is shielded. Additional quieting is obtained by using coaxial electrodes. The simulator features parametric control of fluid properties, corrosion rates, turbulence, fluid velocity, model shape and materials. (Author)

AD-609 719 Div. 8
OTS Prices: HC $3.00/MF $0.75

Space-General Corp., El Monte, Calif.
EXPERIMENTAL RESEARCH INVESTIGATION OF EXTREMELY LOW FREQUENCY PROPAGATION.
Final rept.
by P. I. Kuhnle and R. D. Smith. Dec 64,
68p SGC-491R-1
Contract AF30 602 3385
RADC TDR64 360
Unclassified report

Continuation of Contracts AF19 628 1603 and AF19 604 7448.

Descriptors: (*Radio transmission, Extremely low frequency), (*Extremely low frequency, Propagation), (*Electromagnetic waves, Extremely low frequency), Radio reception, Radiofrequency interference, Radio interference, Noise (Radio), Ahenuation, Phase shift, Radiofrequency, Electromagnetic waves, Wave transmission, Loop antennas, Antennas, Experimental data, Atmospherics, Noise analyzers, Ionospheric propagation, Audiofrequency, Radio reception, Mathematical analysis.

ELF electromagnetic wave propagation was investigated by measuring the characteristics of cw signals transmitted over a 400 cps link established between Bishop, California and Rome, New York; a distance of approximately 4000 km. Data which could be reduced to yield signal strength, attenuation rate, transmission path phase variations, and atmospheric noise amplitude probability distributions (APD) was recorded at the Rome, New York receiver site. Data from the current and previous contract has been compiled to show the range of measured propagation constants. The median measured attenuation constant (rate) is 3 db/1000 km for a nighttime path and 7.8 db/1000 km for a daytime path. The median measured diurnal phase shift constant, through the sunrise period, is 0.13. Measurements are compared with path characteristics calculated using existing theoretical treatments of ELF propagation. Samples of atmospheric noise impulse data and the corresponding atmospheric noise amplitude probability distribution are presented. (Author)

AD-609 731 Div. 8, 2, 6
OTS Prices: HC $6.00/MF $1.50

Mitre Corp., Bedford, Mass.
PROCEEDINGS OF THE TROPOSPHERIC REFRACTION EFFECTS MEETING (NO. 3). VOLUME I. RESULTS AND STATUS OF TROPOSPHERIC-EFFECTS MEASUREMENT PROGRAM.
by L. J. Galbiati. Nov 64, 251p
Contract AF19 628 2390, Proj. 705 1, Task 5930 07 650A
ESD TDR64 148 V1
Unclassified report

Presented at the Mitre Corp., Bedford, Mass. on 28-30 Jul 64.

Descriptors: (*Troposphere, Refractive index), (*Electromagnetic waves, Angle of arrival), (*Atmospheric sounding, Refractive index), (*Ionospheric propagation, Multipath transmission), Symposia, Atmosphere, Optical properties, Measurement, Phase measurement, Interferometers, Polariscopes, Refractometers, Tracking telescopes, Guided missile ranges, Tracking.

This publication covers the presentations made at the Third Tropospheric Refraction Effects Meeting, sponsored by the Electronic Systems Division of The Air Force Systems Command. The proceedings are being published in two volumes for ease in handling; the papers covering the work on tropospheric refraction sponsored by the Electronic Systems Division in support of metric instrumentation on the national missile ranges, are contained in Volume 1. While these papers are complete in themselves, many of the specific details on the work covered in the proceeding of the second Refraction meeting (ESD-TDR-64-103) have not been repeated. The first volume also contains papers on the Findings and Recommendations of the National Academy of Science 'Panel on Tracking Data Analysis' in the Area of Tropospheric Propagation and Refraction, Refractometer and Humidiometer Development of the Naval Research Laboratory, Spaced Refractometer Program of Eastern Test Range, and Canadian Tropospheric Measurement Activities. Presentations on certain refraction activities at the Pacific Missile Range, the National Bureau of Standards, Ft. Huachuca, Ballistic Research Laboratory, M.I.T. Round Hill, Cold Lake Canada, on new measurement techniques, and on Tropospheric and Ionospheric Effects on Interferometer Systems have been included in Volume II. (Author)

AD-609 741 Div. 8, 26
OTS Prices: HC $6.00/MF $1.50

TRW Semiconductors, Inc., Lawndale, Calif.

PRODUCTION ENGINEERING MEASURE, TRANSISTOR, VHF, SILICON, POWER (5W-70mc).
Final rept. for 1 Jun 61-31 Mar 64,
by B. Rappaport. 31 Mar 64, 255p
TRWS-TE-4000:15-F
Contract DA36 039SC85960

Unclassified report

Descriptors: (*Transistors, Very high frequency), (*Power amplifiers, Transistors), (*Transistor amplifiers, Production), (*Silicon, Transistors, Packaged circuits, Seals (Stoppers), Beryllium compounds, Oxides, Manufacturing methods, Design, Test equipment, Tests, Wiring diagrams.

This report is a summary of the work performed under the Production Engineering Measure contract for a transistor delivering 5 watts output at 70 mc. It covers the history and general performance of the contract. Advances in the device and package design are discussed as well as process improvements which were instituted. A description is given of special fabrication and test equipment necessary to the successful accomplishment of the contract objectives. The pilot run is summarized in terms of performance achieved and available capacity of the pilot production line. Test results of the pre-production samples and the final acceptance samples are given. An appendix to the report presents the information necessary to the reproduction of the pilot run and includes input parameters, a flow chart and a process manual. (Author)

AD-609 744 Div. 8, 30
OTS Prices: HC $1.00/MF $0.50

ITT Industrial Labs., Fort Wayne, Ind.
RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES, PHASE II.
Interim development rept. for 2 Sep-2 Dec 64,
by R. W. Hunter. 6 Jan 65, 14p ITT-3308
Contract NObrs87264, Proj. SR00803, Task 9497

Unclassified report

See also: AD-607 614.

Descriptors: (*Storage tubes, Resolution), (*Cathode ray tubes, Storage tubes), Electron tube parts, Electron beams, Cathode ray tube screens, Electrodes, Brightness, Electron guns, Performance (Engineering).

The collector-to-backing electrode spacing seems to have little direct effect upon the stored resolution. However, it may be a factor in moire patterns which influence the low brightness resolution. This moire is believed to be a result of not only collector and backing electrode mesh numbers but also the spacing between them. Other factors affecting moire are the raster line spacing and rotation relative to these meshes. A definite improvement in resolution is achieved by reducing the transit time of electrons in the viewing screen-to-backing electrode space. This increase in resolution is limited by the gradient which can be established between the viewing screen and the backing electrode without voltage breakdown. An improved writing gun has been designed. Further tests and improvements are in progress. (Author)

AD-609 745 Div. 8
OTS Prices: HC $3.00/MF $0.75

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
Special scientific rept. no. 4, 1963-1964,
by K. R. Kaplan, C. V. Srinivasan, and R. O. Winder.
30 Oct 64, 63p
Contract AF19 604 8423, Proj. 5632, Task 563202
AFCRL 64 893

Unclassified report

See also AD-609 705.

Descriptors: (*Switching circuits, Theory), (*Reliability (Electronics), Switching circuits), (*Electrical networks, Gates (Circuits)), Errors, Corrections, Artificial intelligence, Bionics, Computer logic, Functions, Probability, Linear programming, Networks, Special functions (Mathematical).

The report consists of four independent sections: (1) 'Tschebycheff Approximation and Threshold Functions' provides, among other things, a new characterization of threshold functions - a function is a threshold function if and only if its Tschebycheff-best linear real approximation realizes it. (2) 'Properties of Threshold Functions' defines a system of unifying properties of threshold functions which incorporate k-monotonicities and k-dualmonotonicities; the ideas are applied to yield a strong and important new characterization of threshold functions for specific n. (3) 'On Threshold Functions Through n = 7' reports the methods used in, and implications of, an enumeration published elsewhere. (4) 'A Burst Error-Correcting Code' discusses a new code, suitable for use in batch-fabricated memories, which requires extremely simple encoding-decoding equipment. (Author)

AD-609 761 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.
RUGGEDIZED MICROWAVE DUPLEXING TUBES: PRODUCTION ENGINEERING MEASURES PROGRAM.
Quarterly progress rept. no. 7, 12 Sep-12 Dec 63,
by Paul Basken. 12 Dec 63, 14p
Contract DA36 039SC85987

Unclassified report

See also AD-601 464, 601 465, 601 466.

Descriptors: (*Transmit-receive tubes, Radar duplexers), (*Radar duplexers, Transmit-receive tubes), (*Manufacturing methods, Transmit-receive tubes), Quality control, Production, Broadband, X band, Microwave equipment, Military requirements, Test equipment (Electronics), Manuals.

During this quarter of the program, manufacture and testing of the pilot run tubes was started. The individual sections of the Inspection and Quality Control Manual were prepared. Two major problem areas during tube assembly necessitated a delay in the completion of the pilot run tubes. (Author)

AD-609 774 Div. 8, 5, 30
OTS Prices: HC $2.00/MF $0.50

Mitre Corp., Bedford, Mass.
EFFICIENCY OF A ROUTING SCHEME IN A MOBILE DATA PROCESSING COMMUNICATION NETWORK,
by P. Hamburger. Dec 64, 35p
W-06390/0000/01/1/00
Contract AF19 628 2390, Proj. 600 6
ESD TDR64 635

Unclassified report

Descriptors: (*Communication theory, Networks), (*Networks, Communication theory), (*Data processing

systems, Mobile), Communication systems, Signals, Scheduling, Optimization, Costs, Mathematical analysis.

This document examines the efficiency of a routing scheme for mobile communication nodes with data processing capability. Expressions for evaluating its cost in data rate as a function of the pertinent system variables are given. The data rate cost is compared with that of broadcasting all messages. (Author)

AD-609 776 Div. 8, 19
OTS Prices: HC $4.00/MF $0.75

Pickard and Burns Electronics Div., Gorham Corp., Waltham, Mass.
ATOMIC OSCILLATOR DEVICE FOR NAVIGATION-GUIDANCE.
Interim engineering rept. no. 4,
by R. H. Woodward, L. Johnson, R. Sanborn, I. Felch, and R. L. Smith. 30 Oct 64, 109p PandB-916
Contract AF33 657 11384, Proj. 4144, Task 414411
Unclassified report

See also AD-603 245.

Descriptors: (*Microwave oscillators, Cesium electron tubes), (*Cesium electron tubes, Microwave oscillators), (*Atomic clocks, Cesium electron tubes), Oscillators, Beam power tubes, Microwave frequency, Amplifiers, Digital systems, Delay circuits, Modulation, Demodulation, Frequency multipliers, Klystrons, Collimators, Electron optics, Navigation, Guidance.

Detailed design parameters and usable hardware for the new cesium beam tubes were generated. Assembly of a prototype beam tube is the next step. Two breadboard primary loops were tested using comparison techniques. Results indicate that spectral purity requires further improvements, which will be a major task next interim. (Author)

AD-609 794 Div. 8, 2, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CALCULATION OF MAXIMUM APPLICABLE FREQUENCIES FOR COMMUNICATION BETWEEN TWO POINTS BY A DIGITAL COMPUTER,
by E. M. Kovalevskaya. 28 Nov 64, 10p
FTD TT64 383; TT 65 60591
Unclassified report

Unedited rough draft trans. of Geomagnetizm i Aeronomiya (USSR) 1963, v. 3, no. 5, p. 991-994.

Descriptors: (*Radio frequency, Determination), (*Radio communication systems, Radio frequency), Radio transmission, Radio waves, Propagation, Ionospheric propagation, Digital computers, USSR.

Methods are given for calculation of the highest and lowest working frequencies that will insure stable radio communication on a given radio link. A digital computer is used for calculating the frequencies. The algorithm is given on which the computer program is based and that is used to compute the maximum frequency applicable for radio links by use of the E, F1, and F2 reflecting layers of the ionosphere. Calculations of the highest working frequency by digital computer were in reasonable agreement with those obtained from the monthly prognosis of radio wave propagation.

AD-609 795 Div. 8, 5, 19, 30
OTS Prices: HC $1.00/MF $0.50

Army Electronics Command, Fort Monmouth, N. J.
USAEL PRIMARY FREQUENCY STANDARDS.
Technical rept.,
by John G. Zesewitz. Jun 64, 18p
Proj. 1P622001A058, Task 1P622001A058 02
ECOM 2475
Unclassified report

Descriptors: (*Radiofrequency, Standards), (*Atomic clocks, Standards), (*Radiofrequency oscillators, Timing devices), Radiofrequency stabilizers, Navigational aids, Piezoelectric crystals, Quartz, Crystal oscillators, Cesium electron tubes, Communication systems, Life expectancy, Phase (Electronics), Power supplies, Masers, Electronics laboratories, Stability.

A primary frequency standard with the utmost in stability and accuracy is required by USAEL for research into short-term and long-term frequency stability of frequency measuring devices, rf oscillators, piezoelectric crystal-controlled equipments, and also in quartz crystal development. A good standard is vital for such research. The current USAEL standard is a cesium-beam frequency standard with a lifetime stability of 5 parts in 10 to the 12th power. This report gives a brief description of the USAEL primary frequency standard, its environmental conditions, the supporting oscillators, and the frequency distribution system. (Author)

AD-609 799 Div. 8, 30
OTS Prices: HC $3.00/MF $0.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
INVESTIGATIONS OF ADAPTIVE DETECTION TECHNIQUES.
Final rept. for Aug 63-Aug 64,
by John G. Lawton. Nov 64, 79p RM-1744-S-2
Contract Nonr392700, Proj. NR187 400
Unclassified report

Descriptors: (*Electromagnetic pulses, Monitors), (*Communication theory, Demodulation), (*Demodulation, Electromagnetic pulses), Radio signals, Pulse analyzers, Wave analyzers, Frequency analyzers, Nonlinear systems, Digital computers, Analog computers, Computer logic, Radio antijamming, Mathematical analysis, Filters (Electromagnetic wave), Special functions (Mathematical), Signal-to-noise ratio, Adaptive communication systems, Modulation, Oscillators, Communication systems, Wiring diagrams.

This report is concerned with the determination of the characteristics of adaptive signal detection and waveform estimation systems. The signals of interest are pulse like, recur sporadically and are masked by noise. The objective of the adaptive system is to detect and describe these signals without having detailed knowledge of their waveshapes, strength, signal-to-noise ratio or statistics of occurrence. A system is developed which determines the coefficients of an orthonormal expansion of its input waveform, decides at what instants a signal is most likely to be present and builds up a description of the signal waveform. The best orthonormal expansion to use in such a system is determined by the statistics of the set of signals with which the system is to operate. An adaptive system, using a Laguerre expansion was analyzed in more detail. Such a system was constructed and evaluated using analogue computer and digital logic techniques. Results of the simulation show that the system operates in accordance with theory and should be useful in defining the capabilities and limitations of such systems. The performance of this system is illustrated by means of plots and graphs. (Author)

AD-609 808 Div. 8, 25, 30
OTS Prices: HC $5.00/MF $1.00

Motorola Inc., Phoenix, Ariz.
ELECTRONIC PARTS-ACCELERATED LIFE TESTS.
Final rept. for 31 Jan 63-30 Jan 64,
by P. H. Greer. Oct 64, 171p
Contract AF30 602 2970, Proj. 5519, Task 551902
RADC TDR64 142

Unclassified report

Descriptors: (*Transistors, Reliability (Electronics)), (*Reliability (Electronics), Transistors), (*Test equipment (Electronics), Transistors), Silicon, Environmental tests, Life expectancy, Failure (Mechanics), Acceleration, Epitaxial growth, Stresses, Mathematical analysis, Test methods, Stability, Semiconductor devices.

The purpose of this effort was to investigate and develop test measurement techniques to controllably accelerate aging of silicon epitaxial planar transistors and to empirically determine a linear equation relating stress factors, environmental tests, and operating life tests, thereby making it possible to predict the reliability of these transistors. A total of 4265 PNP type 2N1132 transistors were used as the vehicles for this program. Summaries of the results of step-stress tests, operating life tests, environmental tests, and matrix test are presented. Analysis of these test results with estimated acceleration factors, failure rates, and parameter distribution and stability plots are also presented. Important conclusions resulting from the tests completed along with recommendations of areas in which additional studies might be pursued to obtain a better method of transistor reliability prediction and measure are contained in the report. (Author)

AD-609 809 Div. 8, 5, 12, 25
OTS Prices: HC $4.00/MF $1.00

Sylvania Electric Products, Inc., Buffalo, N. Y.
MODIFICATIONS MADE TO THE USAF TRANSPORTABLE PASSIVE SATELLITE COMMUNICATIONS TERMINAL.
Final rept. for 31 Jan 63-31 Aug 64,
by L. R. Megarel. Dec 64, 150p
Contract AF30 602 2944, Proj. 4519, Task 451901
RADC TDR64 428

Unclassified report

Descriptors: (*Microwave communication systems, Communication satellites (Passive)), (*Communication equipment, Microwave equipment), X band, Frequency multipliers, Modulators, Antenna feeds, Waveguides, Transducers, Traveling-wave-tubes, Oscillators, Timing devices, Varactor diodes, Power amplifiers, Transistor amplifiers, Polarization, Portable.

The purpose of this effort was to increase the capabilities of the Transportable Passive Satellite Communications Terminal. Modifications made include a new 'X' band feed structure to permit transmission and reception on either of two orthogonal linear polarizations, adding a diplexer to permit reception of an 'X' band signal while simultaneously transmitting a 10 kw 'X' band signal, and adding single sideband and double sideband suppressed carrier modulation capability to the existing frequency modulated transmitter. In addition, a stable frequency source was installed which has a stability and accuracy of better than one part in 10 to the 9th power. Necessary frequency synthesizers were added to permit changing the transmit frequency from 7630 Mc to 8330 Mc and the antenna feed line was modified to permit operation at the new frequency of 8330 Mc. (Author)

AD-609 813 Div. 8, 25
OTS Prices: HC $3.00/MF $0.50

General Electric Co., Syracuse, N. Y.
INVESTIGATION OF FERRITE PHASE SHIFTERS AT C-AND X-BAND.
Semiannual rept. no. 1,
by Robert Seckelmann. Dec 64, 52p
Contract AF30 602 3482, ARPA550

Unclassified report

Descriptors: (*Phase shifters, Ferromagnetic materials), C band, X band, Magnetic properties, Waveguides, Dielectrics, Magnetic fields, Ferrites, Phase shift, Coaxial cables, Radio fields, Pulse generators, Magnetic cores, Effectiveness, Mathematical models.

Three problems encountered in latched digital phase shifters controlled by partial magnetization, are dealt with. (1) The efficiency of flux transfer and the possibility to add flux bits. Experimental data and a theory in agreement with these data are presented. (2) The control of rf-fields in a ferrite loaded guide to achieve (a) a high differential phase shift per loss, and (b) a linear relation between differential phase shift and transferred flux: First results obtained with slab line and waveguide type phase shifters are given. Models to analyze the possible modes in these devices are discussed. (3) The onset of non-linear losses at a certain magnetic rf-field strength. In a coaxial line completely filled with ferrite a TEM mode exists. The magnetic field can easily be calculated from the incident power. Threshold field strengths are given for various ferrites. (Author)

AD-609 843 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
Quarterly progress rept. no. 9, 14 Jun-14 Sep 64,
by P. N. Oakes. 14 Sep 64, 17p
Contract DA36 039sc86731

Unclassified report

Descriptors: (*Cathode ray tubes, Manufacturing methods), (*Vidicons, Design), Electrostatics, Deflection, Electrodes, Image orthicons, Electron guns, Live expectancy, Tests.

Advances gained during the eighth quarter were capitalized upon in the ninth quarter to such an extent, that a minor breakthrough was experienced, resulting in the completion of five operable tubes. One of these tubes, no. 846-1, was placed on life test at an intermim MIL-E-1E type specification and presently is still undergoing this test. At the close of this period more than 300 hrs. of life testing have been completed. Two of the five tubes completed (one of which is the life test tube) show satisfactory results at operable voltage levels; the other three are operable but are not of the quality of the forementioned tubes. The tube design has been finalized, and no further modifications are anticipated. (Author)

AD-609 857 Div. 8, 15
OTS Prices: HC $1.00/MF $0.50

Illinois Univ., Urbana. Engineering Experiment Station.

ON ANALYTIC CONTINUATION OF A CLOSED REGION SOLUTION TO AN OPEN REGION.
Technical rept. no. 2,
by R. Mittra and D. S. Karjala. Nov 64, 20p
Contract AF19 628 3819, Proj. 4600, Task 460004
AFCRL 64 952

Unclassified report

See also AD-601 131.

Descriptors: (*Boundary value problems, Electromagnetism), (*Electromagnetism, Boundary value problems), (*Waveguides, Electromagnetic wave reflections), Dielectrics, Plasma medium, Integral equations, Functions, Series.

The purpose of this paper is to investigate the question of whether or not it is possible to derive the solution of an open region problem as a limiting case of a closed region boundary value problem. The particular geometry is that of a bifurcated waveguide which becomes equivalent to a semi-infinite parallel plate waveguide when the top plate recedes to infinity. It will be shown that the expression for the reflection coefficient in the parallel plane bifurcated waveguide may be analytically continued to yield the reflection coefficient in the semi-infinite waveguide radiating into space. The latter problem has been solved by Vainshtein, Marcuvitz, and Noble. The technique described here may prove useful for solving other open region problems such as the launching of surface waves by a semi-infinite waveguide for which the application of Wiener-Hopf Technique is fairly involved. (Author)

9. Fluid Mechanics

AD-609 458 Div. 9, 12
OTS Prices: HC $5.00/MF $1.25

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
PRESSURE MEASUREMENTS FOR MACH 8 FLOWS OVER EXPANSION CORNERS AND RAMPS ON AN INTERNALLY COOLED MODEL. PART II. FLOWS OVER A FLAT PLATE WITH AND WITHOUT A PARTIAL SPAN RAMP. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS.
by Louis G. Kaufman, II. Oct 64, 184p
Contract AF33 616 8130, Proj. 8219, Task 821902
RTD TDR63 4044 P2

Unclassified report

Descriptors: (*Hypersonic flow, Aerodynamic configurations), (*Aerodynamic control surfaces, Hypersonic flow), (*Flat plate models, Aerodynamic characteristics), Trailing control surfaces, Aerodynamic heating, Cooling, Reynolds number, Angle of attack, Hypersonic wind tunnels, Surface temperatures, Reentry vehicles, Boost-glide vehicles, Experimental data.

Pressure distributions were obtained for Mach 8 flows over a sharp 40 degree expansion corner and ahead of ramps on an internally cooled model. Full and partial span ramps, having wedge angles up to 30 degrees, were tested at model angles of attack from -45 to +10 degrees for Reynolds numbers ranging from 1.1 to 3.3 million. The model wall temperature was maintained at fairly constant levels ranging from 450 to 1150 degrees Rankine. (Author)

AD-609 460 Div. 9
OTS Prices: HC $2.00/MF $0.50

Aeronautical Research Associates of Princeton, Inc., N. J.
AN EXPERIMENTAL STUDY OF TURBULENCE IN A DRIVEN VORTEX,
by Colman duP. Donaldson and Guy G. Williamson.
Jul 64, 44p ARAP-TM-64-2
Contract AF49 638 1187, Proj. 9781, Task 978101
AFOSR 64 1924

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Vortices, Turbulence), (*Turbulence, Vortices), Vortex generators, Fluid flow, Rotation, Reynolds number.

Measurements have been made at two rotational speeds of the mean motion and turbulence levels within a shallow vortex chamber that has a rotating porous wall as an outer boundary. Very nominal levels of turbulence (2 to 3 percent) were observed on the central plane of these vortices while a significant portion of the mass flow through the vortex was observed to pass through the end wall boundary layers. A fairly high level of turbulence was then introduced into this vortex chamber by means of a grid of axially aligned bars at the outer rim of the vortex. This high level of turbulence was observed to decay rapidly to a relative level of intensity of about 6 percent, indicating that for tangential Reynolds numbers up to at least 100000, the flow with a driven vortex is stable with respect to the introduction of turbulence. The results obtained corroborate Kendall's findings, namely that the primary cause of the degradation of the performance of a confined vortex is the leakage of mass flux through the boundary layers on the end walls of the vortex chamber. (Author)

AD-609 496 Div. 9, 15, 25
OTS Prices: HC $2.00/MF $0.50

Spaces Sciences Lab., General Electric Co., Philadelphia, Pa.
RESEARCH ON HYPERSONIC RAREFIED PLASMA FLOWS.
Final rept. for 15 Oct 63-14 Oct 64,
by B. B. Hamel. 13 Nov 64, 35p
Contract AF49 638 1283
AFOSR 64 2471

Unclassified report

See also: AD-604 749.

Descriptors: (*Hypersonic flow, Mathematical models), (*Gas flow, Mixtures), (*Hydrodynamics, Gas flow), Gases, Molecular weight, Temperature, Velocity, Thermal conductivity, Gas ionization, Reaction kinetics, Partial differential equations, Relaxation time, Jet mixing flow, Plasma physics.

A modified form of the Chapman and Enskog transport theory for gas mixtures was developed for a neutral, binary mixture with disparate molecular weights. The difficulties in the past have been that the usual Chapman and Enskog theory was based on a single time scale for the molecular relaxation. As pointed out by Grad, this relaxation occurs on a multiple time scale, and this fact is exploited in deriving a modified Chapman and Enskog theory. (Author)

AD-609 499 Div. 9, 13, 25
OTS Prices: HC $4.00/MF $0.75

David Taylor Model Basin, Washington, D. C.
FORCED VIBRATION OF BEAMS AND FLUTTER OF BEAM-FOIL SYSTEMS,
Research and development rept.,
by E. H. Kennard and Ralph C. Leibowitz. Oct 64, 101p
DTMB 1848

Unclassified report

Descriptors: (*Vibration, Beams (Structural)), (*Beams (Structural), Hydrodynamics), (*Hydrofoils, Flutter), Structural properties, Mechanics, Theory, Mathematical analysis, Differential equations, Shear stresses, Damping, Frequency.

Equations are developed for two-dimensional harmonic transverse forcing at any point of an undamped uniform beam having bending and shearing flexibilities and for harmonic end forcing of a uniform beam having also external and internal damping. Variations of beam influence and inertia coefficients with frequency are discussed for an undamped beam without shear warping. Equations are also developed for the determination of the flutter speed of a rigid hydrofoil flexibly attached to such a beam. The flutter process is illustrated by a detailed discussion of two simple cases of flutter. (Author)

AD-609 534 Div. 9, 15, 25
OTS Prices: HC $2.00/MF $0.50

Douglas Aircraft Co., Inc., Long Beach, Calif.
SOLUTIONS OF THE MAGNETOFLUID-DYNAMIC BOUNDARY-LAYER EQUATIONS FOR A FLAT PLATE WITH A MOVING TRANSVERSE MAGNETIC FIELD.

SOURCE OR CROSSED ELECTRIC FIELD IN THE SPANWISE DIRECTION,
by N. A. Jaffe. 1 Nov 64, 50p LB-31693

Unclassified report

Descriptors: (*Magnetohydrodynamics, Field theory), (*Field theory, Boundary value problems), (*Fluid flow, Laminar boundary layer), (*Flat plate models, Fluid flow), Laminar flow, Magnetic fields, Gas flow, Supersonic flow, Gas ionization, Conductivity, Drag, Ionization, Viscosity, Heat transfer, Numerical analysis, Differential equations, Shock waves, Incompressible flow.

The effects of a transverse magnetic field on velocity profiles in the boundary layer of a conducting fluid are investigated. A numerical technique is used to obtain solutions of the combination of continuity and momentum equations for flow of an incompressible fluid over a flat plate. Both variable conductivity and constant conductivity are studied. In the former case a magnetic-field velocity ratio is defined and its effect on velocity profiles is examined. It is shown that when the magnetic-field velocity ratio is zero, the magnetic effect will decrease skin friction; increase displacement thickness, momentum thickness, and net drag; and destabilize the boundary layer. These effects are reversed when the magnetic-field velocity ratio is greater than or equal to unity. Nonsimilarity effects are studied by solving the equations when the magnetic-interaction parameter is allowed to increase linearly with distance from the leading edge. The results show that for given values of the magnetic-interaction parameter and magnetic-field velocity ratio the effects are greater for a similarity solution than for a nonsimilarity solution; however, the similarity solutions are a fair approximation of the nonsimilarity except where the boundary layer is near separation, and here there is noticeable divergence.

AD-609 559 Div. 9
OTS Prices: HC $2.00/MF $0.50

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR MACH 21 FLOWS OVER A BLUNT PYRAMIDAL CONFIGURATION WITH AERODYNAMIC CONTROLS. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS,
by Louis G. Kaufmann, II. Aug 64, 49p
Contract AF33 616 8130, Proj. 8219, Task 821902
FDL TDR64 120

Unclassified report

Descriptors: (*Pressure, Hypersonic flow), (*Heat transfer, Hypersonic flow), (*Hypersonic flow, Separation), Aerodynamic configuration, Aerodynamic control surfaces, Blunt bodies, Delta wings, Dihedral angle, Cannard configuration, Fins, Wedges, Trailing control surfaces, Flaps, Wind tunnel models, Hypersonic wind tunnels, Reynolds number, Experimental data, Angle of attack, Pitch (Motion), Aerodynamic characteristics, Reentry vehicles, Aerodynamic control surfaces, Measurement.

Pressure and heat transfer data were obtained for Mach 21 flows over a blunt pyramidal configuration composed of a 70 degree sweepback delta wing surface and two dihedral surfaces. Instrumented trailing edge flaps were mounted in pairs on either the delta wing or dihedral surfaces and an uninstrumented ventral fin was attached during several test runs. The model was pitched at angles of attack between -30 and +45 degrees for free stream Reynolds numbers, based on model length, of approximately 51,000. (Author)

AD-609 568 Div. 9, 25
OTS Prices: HC $2.00/MF $0.50

Cincinnati Univ., Ohio.
EXTENSION OF THE M2-AND THE THIN-WING EXPANSION METHODS TO MAGNETOHYDRODYNAMICS. Interim technical rept.,
by Kinzo Hida. Nov 64, 26p
Contract AF33 616 8453, Proj. 7064
ARL 64 176

Unclassified report

Descriptors: (*Magnetohydrodynamics, Power series), (*Power series, Magnetohydrodynamics), (*Airfoils, Transonic flow), Slender bodies, Thin wings, Two-dimensional flow, Magnetic fields, Fluid flow, Compressible flow, Plasma medium, Velocity, Boundary value problems, Gas flow, Fluid mechanics.

On the basis of a reduced equation for steady, two-dimensional flow of a perfectly conducting gas with an aligned magnetic field, the M(2)- expansion method as well as the thin-wing-expansion method are extended to include the effect of a magnetic field. General formulae obtained by both methods remain unchanged, except that the parameters involved are redefined. The transonic thin-airfoil theory is also modified for magnetohydrodynamical flow and it is found that the same similarity rule for the flow past a slender body holds for both non-magnetic and magnetic cases with the proper alteration of the parameters. (Author)

AD-609 574 Div. 9, 4, 25
OTS Prices: HC $1.00/MF $0.50

Polytechnic Inst. of Brooklyn, N. Y.
LINEARIZED ANALYSIS OF UNSTEADY, REACTING FLOWS WITH BODY FORCES,
by Pasquale M. Sforza. Sep 64, 24p PIBAL-848
Grant AF AFOSR1 63, Proj. 9781 01
AFOSR 64 1873

Unclassified report

Descriptors: (*Gas flow, Mathematical models), (*Diffusion, Gas flow), Fluid flow, Boundary value problems Mathematical analysis, One-dimensional flow, Chemical equilibrium, Deflection, Mixtures, Velocity, Heat transfer, Buoyancy, Viscosity, Diaphragrams (Mechanics), Relaction time, Perturbation theory.

An investigation of the effect of body forces on a one-dimensional, unsteady flow of a reacting gas is presented. The model proposed for this study is that employed by Sforza and Bloom i.e. a central region of gas is perturbed from the state and flow reference values of the ambient and the subsequent temporal and spatial variations of the imposed perturbations are studied analytically. In the present report the configuration of the perturbed region is taken to be slab-like; this corresponds to a steady two-dimensional jet-or-wake-like flow. Results indicate that the effect of buoyancy forces on the velocity field is inversely proportional to the amount of energy absorbed in the chemical relaxation process. In particular, solutions for the case of very small chemical energy absorption become unbounded with time within the present approximation. (Author)

AD-609 575 Div. 9, 15, 25
OTS Prices: HC $2.00/MF $0.50

Polytechnic Inst. of Brooklyn, N. Y.
REVIEW OF THEORETICAL INVESTIGATIONS ON THE EFFECT OF HEAT TRANSFER ON LAMINAR SEPARATION,
by Morris Morduchow. Jul 64, 44p PIBAL-831

Grant AF AFOSR1 63, Proj. 9781 01
AFOSR 64 1658

Unclassified report

Descriptors: (*Heat transfer, Laminar flow), (*Laminar flow, Seperation), Two-dimensional flow, Laminar boundary layer, Fluid flow, Theory, Mathematical analysis, Partial differential equations, Shear stresses, Surface properties.

A review is made of theoretical investigations on the effect of heat transfer on laminar separation in classical steady two-dimensional high-speed or low-speed boundary-layer flow. Particular emphasis is placed on the effect of wall temperature on the location of the separation point. An Appendix gives a review of results on the effect of Mach Number on the laminar separation point for a linearly diminishing external velocity and zero heat transfer. (Author)

AD-609 576 Div. 9, 15
OTS Prices: HC $1.00/MF $0.50

Polytechnic Inst. of Brooklyn, N. Y.
FURTHER SIMILARITY SOLUTIONS OF WAKES AND JETS. PART I. TWO-DIMENSIONAL FLOWS. PART II. AXISYMMETRIC FLOWS,
by Martin H. Steiger, Karl Chen, and Martin H. Bloom. Sep 64, 22p PIBAL-811
Grant AF AFOSR1 63, Proj. 9781 01
AFOSR 64 1944

Unclassified report

Descriptors: (*Fluid mechanics, Numerical analysis), Wake, Jets, Two-dimensional flow, Axially symmetric flow, Jet mixing flow, Incompressible flow, Boundary layer, Differential equations, Integration.

AD-609 577 Div. 9
OTS Prices: HC $2.00/MF $0.50

AVCO-Everett Research Lab., Everett, Mass.
THE NEAR WAKE OF A WEDGE,
by R. Weiss. Dec 64, 47p AVCO RR-197
Contract AF04 694 41
BSD TDR64 150

Unclassified report

Prepared in cooperation with Bell Telephone Labs., Inc., Whippany, N. J., Contract DA30 069ORD1955.

Descriptors: (*Wedges, Wind tunnel models), (*Wake, Laminar flow), (*Fluid mechanics, Separation), Two-dimensional flow, Boundary layer, Numerical analysis, Algebra, Equations, Base flow, Pressure, Reynolds number, Stagnation point, Shear stresses, Aerodynamic configurations.

An analytical model of the two-dimensional laminar near wake is described. All relevant physical features of the flow, including the boundary layer expansion at the shoulder, free shear layers, recirculation regions and recompression region are included. A tractable problem is formulated by matching approximate solutions for each of these regions along mutual boundaries. A set of coupled algebraic equations is derived, and numerical results obtained for the conditions of a wind tunnel wedge experiment. Satisfactory agreement is obtained between the measured and theoretical variation of base pressure with Reynolds number. Additional computations are carried out for a series of wedges of different length, apex angle and wall temperature. The variation of base pressure, wake angle and neck enthalpy ratio with altitude is obtained for these bodies. It is shown that the near wake dimensions scale approximately with body size, and that the neck enthalpy ratio has a significant variation with body size, wall temperature and altitude. The effect of free-stream velocity on the neck enthalpy ratio is seen to be relatively unimportant, however. A number of extensions of the first-order model are suggested. (Author)

AD-609 595 Div. 9, 31
OTS Prices: HC $3.00/MF $0.75

David Taylor Model Basin, Washington, D. C.
WAKE ANALYSIS OF SHIP MODELS TWIN-SCREW MILITARY TYPES,
by H. M. Cheng and J. B. Hadler. Dec 64, 64p
DTMB 1928

Unclassified report

Descriptors: (*Wake, Ship models), (*Ships, Wake), Ship hulls, Propellers (Marine), Velocity, Mathematical analysis, Design, Digital computers, Graphics.

The report, the second of a series on studies of the wake in the propeller plane of ship models, presents the results of analysis of the wake of twin-screw, military-type ship models using the IBM-7090 computer. The data presented are the interpolated longitudinal and tangential velocity distributions, their computed mean values, the harmonic contents of these velocity components, the maximum variations in the resultant inflow velocity, and the advance angles and their variations. Also included are the calculated volumetric wake velocities. (Author)

AD-609 598 Div. 9, 25
OTS Prices: HC $2.00/MF $0.50

Virginia Univ., Charlottesville.
DYNAMICS OF GAS-PARTICLE MIXTURES WITH FINITE PARTICLE VOLUME.
Technical rept.,
by George Rudlinger. Dec 64, 28p CAL-91-P
Contract Nonr362300, Proj. NR098 038

Unclassified report

Subcontracted to Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
To be presented at the AIAA Aerospace Sciences Meeting, (2nd), New York, 25-27 Jan 65.

Descriptors: (*Gas flow, Particles), (*Particles, Gas flow), (*Colloids, Gas flow), Dynamics, Mixtures, Fluid flow, Thermodynamics, Shock waves, Frozen equilibrium flow, Equations of state, Fluid mechanics.

In the analysis of two-phase flows in which a gas carries along a large number of small particles, the volume of the particles is customarily assumed to be negligible. This assumption often is well justified, but if either the mass fraction of the particles or the gas density is sufficiently high, the particle volume fraction may become significant. It is thus important to establish the conditions at which this parameter should be included in a flow analysis. The particles may be considered as incompressible by comparison with the gas so that a finite particle volume fraction appears as an additional variable in the basic equations. Consequences of a finite particle volume are examined for isentropic changes of the mixture, for frozen and equilibrium speed of sound, and for both the frozen flow immediately behind a shock wave and the equilibrium flow that is established further downstream. The errors which would result from neglecting the particle volume range from insignificant to large. For example, even for gas-particle density ratios as low as 0.001, the equilibrium

flow velocity behind a shock front is quite sensitive to changes of the volume of the particles if they represent more than one-half of the mass of the mixture. (Author)

AD-609 599 Div. 9
OTS Prices: HC $2.00/MF $0.50

Naval Weapons Lab., Dahlgren, Va.
LOCAL BOUNDARY LAYER APPROXIMATIONS OF REGULAR FLOWS PAST A SEMI-INFINITE PLATE,
by E. W. Schwiderski and H. J. Lugt. Oct 64, 30p
NWL 1918

Unclassified report

Descriptors: (*Fluid flow, Boundary layer), (*Boundary layer, Fluid flow), (*Flat plate models, Fluid flow), Incompressible flow, Laminar flow, Fluid mechanics, Laminar boundary layer, Viscosity, Numerical analysis, Boundary value problems, Partial differential equations, Wake.

This paper is concerned with regular symmetric motions of an incompressible fluid past a semi-infinite flat plate which has been immersed in a uniform parallel stream. The Navier-Stokes equations are reduced to three ordinary differential equations by local boundary layer approximations of first order. The remaining ordinary boundary value problem is numerically integrated for flows of stagnation and wake type of various Reynolds numbers. Complete numerical results are presented in tables and figures. (Author)

AD-609 629 Div. 9, 30
OTS Prices: HC $1.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
CRITICAL PRESSURES FOR THE INCEPTION OF CAVITATION IN A LARGE-SCALE NUMACHI NOZZLE AS INFLUENCED BY THE AIR CONTENT OF THE WATER,
by S. F. Crump. Jul 51, 21p
Proj. NS713 065
DTMB 770; PB 166 346 canceled

Unclassified report

Descriptors: (*Nozzles, Cavitation), (*Cavitation, Nozzles), Venturi tubes, Pressure, Air, Vortices, Diffusers, Model tests, Water tunnels.

A 12-scale model of a Numachi Nozzle 22, a venturi-type nozzle with an abrupt diffuser, was tested to determine the critical pressures for the inception of cavitation as a function of the air content of the water. The test results are compared with those of Numachi. Although the absolute values of the critical pressures for cavitation inception do not agree in the two investigations, the same general trends were observed. It is believed that the observed differences are due to vortex formation in the diffuser and Reynolds-number effects. (Author)

AD-609 632 Div. 9
OTS Prices: HC $2.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
THE USE OF DOUBLY REFRACTING SOLUTIONS IN THE INVESTIGATION OF FLUID FLOW PHENOMENA,
by Benjamin Rosenberg. Mar 52, 45p
DTMB 617; PB 106 613 canceled

Unclassified report

Descriptors: (*Flow visualization, Colloids), (*Colloids, Refraction), (*Fluid flow, Test methods), Liquids, Clay minerals, Solutions, Particle size, Photoelasticity, Optics, Hydrodynamics, Two-dimensional flow, Laminar flow, Turbulence, Drag, Lift, Relaxation time, Shear stresses, Viscosity, Velocity, Pressure, Handling, Preparation.

The feasibility of using doubly refracting liquids for qualitative and quantitative flow studies is discussed. Of the many liquids which have the property of streaming double refraction, colloidal solutions of bentonite are most suitable because of their high sensitivity, low viscosity, cheapness, and comparative ease of preparation. The problems involved in the preparation and handling of bentonite solutions and the physical factors affecting the double refracting properties of bentonite, such as concentration, particle size, and temperature are investigated. An outline of the essential optical theory and of the application of double refraction methods in photoelasticity is presented. The methods of generating and measuring double refraction are described and an optical setup suitable for hydrodynamic studies is recommended. A thorough survey of existing literature concerning streaming double refraction for colloidal solutions and pure liquids is made. This includes the hydrodynamic theories developed. A method of determining the velocity distribution and streamlines for two-dimensional laminar flow utilizing ideas obtained from the literature is suggested. However, the adequacy of the hydrodynamic theory as applied to colloidal particles in two-dimensional flow is open to question. Therefore a more complete analysis is attempted. These results indicate the need for special experiments in order to determine the proper relationships between double refraction and velocity gradients. A method for determining the velocity distribution and streamlines using pure liquids possessing birefringent properties is also presented. (Author)

AD-609 729 Div. 9, 31
OTS Prices: HC $3.00/MF $0.75

Therm Advanced Research, Inc., Ithaca, N. Y.
ON THE THEORY OF THE LOW-ASPECT-RATIO JET-FLAP HYDROFOIL.
Final rept.,
by J. C. Erickson, Jr. and G. R. Hough. Oct 64, 58p
TAR-TR-6405
Contract Nonr427500

Unclassified report

Descriptors: (*Hydrofoils, Lift), (*Jet flaps, Hydrofoils), Aspect ratio, Statistical analysis, Equations, Integrals, Pitch (Motion), Control systems, Submarines, Theory.

The equation for the lifting problem of a finite-aspect-ratio, thin, jet-flap hydrofoil in unbounded flow is considered and certain of its important properties are derived. Previous approximate and analog solutions of this equation are then briefly reviewed. An analytical approach to the low-aspect-ratio case is initiated by applying the well-known Jones approximation to a hydrofoil with jet flap. A solution is obtained and the results compared with analog solutions and existing limiting cases. Deficiencies of this approximation are immediately apparent, especially for a deflected jet (singular blowing) and a rectangular planform. As a result, the improved low-aspect-ratio theory of H. R. Lawrence is extended to include a jet flap. The corresponding equation is derived and its behavior is investigated with respect to the important properties of the exact equation. Finally, a tentative procedure for solving this equation is advanced and discussed. (Author)

AD-609 736 Div. 9, 12
OTS Prices: HC $1.00/MF $0.50

Heliodyne Corp., Los Angeles, Calif.
RE-ENTRY PHYSICS RESEARCH.

Semi-annual technical summary rept. for 12 Jun-31 Dec 64,
Dec 64, 17p
Contract DA04 495AMC458Z, ARPA Order 360
Unclassified report

Rept. on Project Defender.

Descriptors: (*Atmosphere entry, Reviews), (*Reentry vehicles, Fluid dynamic properties), Chemical reactions, Wake, Turbulence, Dissociation, Optical properties, Shock tubes, Laminar flow, Stability, Dust, Vibration, Gases, Ablation, Spectroscopy, Electromagnetic waves, Kinetic theory, Abstracting.

Investigations were conducted in the following areas: mixing and chemical reactions in turbulent wakes; stability of two-dimensional and axi-symmetric laminar wakes; the influence of non-adiabatic collisions in the vibrational and dissociative relaxation of a high temperature gas; analyses of optical scintillation data from reentry field tests; and shock tube investigations of the spectroscopic and electromagnetic properties of ablation product/air mixtures. The individual research topics are described in the form of abstracts from completed reports, or progress reports on continuing activities. (Author)

AD-609 778 Div. 9
OTS Prices: HC $2.00/MF $0.50

Hydraulic Engineering Lab., Univ. of Texas, Austin.
SEPARATION IN A NON-UNIFORM SHEAR FLOW,
by Charles Dalton and Frank D. Masch. Sep 64,
28p HYD-04-6402
Contract Nonr37516, Proj. SR009 01 01
Unclassified report

Descriptors: (*Cylindrical bodies, Fluid flow), (*Fluid flow, Separation), Hydrodynamics, Velocity, Boundary layer, Reynolds number, Flow visualization, Three-dimensional flow, Mathematical analysis, Shear stresses.

The report presents work done to investigate the effects of a non-uniform flow field on the angle of separation for flow about a circular cylinder. Experimental data was compiled which shows that the angle of separation is relatively small in regions where the free stream velocity is high and is relatively large in regions where the free stream velocity is low. The angle at which separation occurred on a circular cylinder was found to vary from 70 degrees to 101 degrees. Data was collected for a Reynolds Number range of 10,000 to 100,000. (Author)

AD-609 788 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONNECTION OF AERODYNAMIC HEAT WITH SKIN FRICTION,
by L. V. Kozlov. 1 Dec 64, 10p
FTD TT64 377; TT 65 60588
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, 1963, no. 4, p. 108-111.

Descriptors: (*Aerodynamic heating, Friction), (*Friction, Heat transfer), (*Heat transfer, Supersonic flow), Boundary layer, Atmosphere entry, Heat transfer coefficients, Experimental data, Mathematical analysis, Flat plate models, Measurement, Wind tunnels, Turbulence, USSR.

The article attempts to determine a more accurate dependence between heat transfer and friction in supersonic flow of gas, flowing over a flat plate, by analyzing experiments with respect to direct and simultaneous measurement of the local values of heat flow and friction.

AD-609 841 Div. 9
OTS Prices: HC $3.00/MF $0.75

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
LAMINAR BOUNDARY-LAYER SEPARATION ON FLARED BODIES AT SUPERSONIC AND HYPERSONIC SPEEDS,
by J. Don Gray. Jan 65, 56p
Contract AF40 600 1000, Projs. 8953, VA2316, Task 895303
AEDC TDR64 277
Unclassified report

Descriptors: (*Laminar boundary layer, Separation), (*Flared afterbodies, Aerodynamic characteristics), Laminar flow, Axially symmetric flow, Hypersonic flow, Supersonic flow, Shock waves, Aerodynamic configurations, Schlieren photography, Reentry vehicles, Pressure, Reynolds number, Correlation techniques.

Experiments at supersonic speeds and at Mach 8 were conducted to determine the conditions which govern the extent of shock-induced laminar flow separations on axisymmetric configurations at zero yaw and without heat transfer. From an extensive correlation of surface pressure data and schlieren photographs, it is shown that the extent of reverse flow is essentially a function of the ratio of the wetted length to the flare divided by the laminar boundary thickness there. As a result, the relative extent of laminar flow separation decreases with a unit Reynolds number increase and grows through an increase in Mach number. Finally, increasing the flare angle increases the length of the reverse flow region. (Author)

AD-609 856 Div. 9, 31
OTS Prices: HC $3.00/MF $0.75

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
EXPERIMENTAL DETERMINATION OF WAVE-EXCITED FORCES AND MOMENTS ACTING ON A SHIP MODEL RUNNING IN OBLIQUE REGULAR WAVES,
by Young Chey. Oct 64, 73p SIT-DL-1046
Contract Nonr 26321, Projs. S R009 01 01, 2802 062
Unclassified report

Rept. contains Appendix: 'Evaluation of Tank 2 Bridge Structure,' by Petros A. Lalangas, SIT Note 687, March 1963; a reprint.

Descriptors: (*Ship models, Hydrodynamics), (*Force (Mechanics), Water waves), Moments, Oscillation, Yaw, Velocity, Determination, Experimental data.

The wave-excited forces and moments acting on a restrained Series 60 (C sub b = 0.60) ship model advancing at constant speed in regular oblique waves were experimentally determined. The oscillatory components and steady mean components of sway force, yaw moment, heave force, and pitch moment are presented in non-dimensional coefficients, and their phases are given.

The forces and moments vary little with forward speed of the model. The mean component of the forces or moments, in some cases, amounts to a fairly large portion of the oscillatory forces or moments. The experimental results are compared with available theoretical results. (Author)

AD-609 869 Div. 9, 12
OTS Prices: HC $4.00/MF $0.75

Lockheed Missiles and Space Co., Huntsville, Ala. Huntsville Research and Engineering Center.
SOLUTION OF THE INVISCID FLOW DUE TO DISPLACEMENT BY THE METHOD OF INTEGRAL RELATIONS.
Technical rept.,
by G. H. Hoffman. Oct 64, 105p H-64-017, LMSC/HREC-A710150

Unclassified report

Descriptors: (*Blunt bodies, Supersonic characteristics), (*Supersonic flow, Numerical analysis), (*Numerical analysis, Integrals), Equations, Motion, Boundary layer, Nose cones, Shock waves, Boundary valve problems, Compressible flow, Fluid mechanics, Spheres, Gas flow, Perturbation theory, Viscosity, Reynolds number, Partial differential equations.

The method of inner and outer expansions as formulated by Van Dyke for the supersonic blunt body problem is considered. The second term in the outer expansion (inviscid flow due to displacement) is treated by the method of integral relations. Knowledge of this term is necessary in order to solve for second-order effects on the boundary layer. As an illustration, the method is applied to a spherical nose. The first and second approximations of the method of integral relations are derived and numerical results obtained for the first approximation. Results on the body surface are compared with those of the approximate solution given by the shifted-expanded body method. Qualitative agreement is found to exist. The variation of second-order shock standoff distance (in air) with Reynolds number is found to be in qualitative agreement with existing experimental results (in Argon). (Author)

10. Fuels and Combustion

AD-609 515 Div. 10, 4
OTS Prices: HC $1.00/MF $0.50

Utah Univ., Salt Lake City.
STUDIES TO DETERMINE THE MECHANISM OF PRODUCTION AND REMOVAL OF ELECTRONS IN FLAMES.
Semi-annual rept. no. 2, 1 Sep 58-28 Feb 59,
by Nalin R. Mukherjee, Takayuki Fueno, Henry Eyring, and Taikyue Ree. 28 Feb 59, 6p
Contract AF04 647 177
Unclassified report

See also AD-607 848.

Descriptors: (*Flames, Ionization), (*Ions, Statistical mechanics), Electrons, Reaction kinetics, Thermochemistry, Aliphatic compounds, Hydrogen, Sulfides, Oxidizers, Fuels, Air, Tables.

In the flame of a hydrogen bearing substance and air or oxygen, the predominant ion has been demonstrated by others using mass spectrographic methods to be H3O+, although there are other ions such as H5O2+, CHO+, OH+. The quasi-equilibrium concentration of H3O+ was therfore determined on a statistical mechanical basis using reactants as the starting point of calculation. The recruitment factor was obtained as the ratio of the observed positive ion concentration to the equilibrium concentration of H3O+.

AD-609 527 Div. 10, 1, 16
OTS Prices: HC $4.00/MF $1.00

Army Engineer Research and Development Labs., Fort Belvoir, Va.
PROJECT BEARS (BACTERIOLOGICAL EFFECTS, AIRCRAFT REFUELING SYSTEMS).
Final rept. for Jan 62-Jan 64,
by Richard R. Rogowski and Robert N. Brown.
9 Oct 64, 147p
Tasks 1D643324D59209, 3 6199 720B816906
AERDL 1789TR
Unclassified report

Original document contains color other than black and white and is available in limited supply. After present stock is exhausted, it will be available in black and white only.

Descriptors: (*Jet engine fuels, Biological contamination), (*Fungus deterioration, Jet engine fuels), (*Fuel systems, Performance (Engineering)), Microorganisms, Fuel filters, Fuel additives, De-icing materials, Germicides, Refueling, Corrosion, Physical properties, Fuel tanks, Water, Handling.

The report covers investigations carried out to determine characteristics and growth rates of microbial contaminants in Military fuels; to learn effects of such contaminants on performance of filter/separators and other fueling system components; and to ascertain effects of certain additives and biocides on microbial growth rates and fuel properties. (Author)

AD-609 591 Div. 10
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
THE ROLE OF ALUMINUM AND ITS OXIDES IN SOLID PROPELLANTS.
Quarterly status rept. no. 1, 1 Jul-30 Sep 62,
by G. Neil Spokes. Oct 62, 15p
Contract AF04 694 128, Proj. PAU4134
SSD TDR62 185, pt. 2
Unclassified report

Descriptors: (*Exhaust gases, Plasma medium), (*Solid rocket propellants, Aluminum), (*Aluminum, Solid rocket propellants), Aluminum compounds, Oxides, Exhaust flames, Impurities, Gas ionization, Electrons, Electrical conductance, Thermionic emission.

Design of a laboratory experiment to investigate the role of aluminum and its oxides as sources or moderators of electrons in rocket exhausts was completed. Electron concentrations in equilibrium with particles will be studied by means of a microwave method. A more detailed study of the theory of electron concentration in high temperature gas-particle mixtures was initiated. Work has just started on the theory of A. C. conductivity of these plasmas. (Author)

AD-609 592 Div. 10
OTS Prices: HC $2.00/MF $0.50

General Dynamics/Convair, San Diego, Calif.
COMBUSTION CHARTS FOR HIGH ENERGY FUELS. II. A DESCRIPTION OF A GENERAL METHOD FOR CALCULATING EQUILIBRIUM CONCENTRATIONS OF COMBUSTION PRODUCTS,
by L. V. Fiegenbutz. 2 Mar 59, 34p ZR-658-031
Unclassified report

Descriptors: (*Rocket propellants, Combustion), (*Solid rocket fuels, Combustion), Aluminum compounds, Metalorganic compounds, Combustion products, Distribution, Thermodynamics, Programming (Computers), Tables.

A program was developed for the IBM-704 that will calculate the concentrations of combustion products for any propellant system as long as the molal free energy function is given for the products. The total thermodynamic properties of the combustion of triethyl aluminum with air were calculated as an example, and the results are presented in the form of combustion charts.

AD-609 600 Div. 10, 4, 27
OTS Prices: HC $1.00/MF $0.50

Malaker Labs., Inc., High Bridge, N. J.
KINETIC STUDY OF ROCKET EXHAUST GASES. STUDY OF RADIATION EMITTED BY MODIFIED AND UNMODIFIED PROPELLANT SYSTEM.
Progress rept. no. 11.
1 Jan 65, 6p
Contract DA30 069ORD2918, Proj. 1A22901A211
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-607 222.

Descriptors: (*Exhaust gases, Reaction kinetics), (*Rocket propellants, Combustion), Phototubes, Spectroscopy, Burning rate, Smokes, Photographic analysis, Rocket motors.

Direct radiation from the propellants was compared with radiation from a Tungsten Strip Lamp. To date the wavelength range studied has been 6000 to 7000 Angstroms as selected by a Wratten No. 29 Glass Filter. Values for radiation emitted by the reference lamps were

determined by simple photometric procedures using published absolute efficiency values for lamp operation at rated voltage and current for standard light values. Detector response to filtered light was measured by similar photometric methods. During propellant combustion, radiation was monitored by a photovoltaic cell (silicon solar cell) through the optical filter. The photoelectric signal level was displayed on a D. C. millivoltmeter and records were kept by photographing this meter and a second meter connected to measure smoke transmission.

AD-609 747 Div. 10, 27
OTS Prices: HC $2.00/MF $0.50

Lockheed Propulsion Co., Redlands, Calif.
THERMAL GRAIN STRUCTURAL ANALYSIS.
Program progress rept. no. 5, 1-30 Apr 62,
30 Apr 62, 40p LPC-578-P-5
Contract AF04 611 8013

Unclassified report

Descriptors: (*Rocket propellant grains, Thermal stresses), (*Thermal stresses, Rocket propellant grains), Rocket propellants, Solid rocket propellants, Propellant grains, Viscoelasticity, Thermal properties, Mathematical analysis, Structures, Thermal conductivity, Cooling, Stresses, Temperature, Viscosity, Elasticity, Thermodynamics, Surface temperatures, Cylindrical bodies, Pressure, Strain (Mechanics).

An engineering approximation to the correct theoretical temperature distribution in a propellant grain has been derived. A set of confirmatory experiments to the approximation is described. These experiments are in progress. The limit elastic solutions to several thermal stress problems are presented. These limit solutions are necessary in order to recognize the existence of the hypothesized stress accumulation problem. Experimental results of cyclic thermal inputs to a uniaxial, end-constrained bar are presented. The claim is made herein that the above test results confirm the hypothesis that there exists a cyclic thermal input whereby the resulting stresses exceed those obtained by a step input over the same temperature range. This confirmation is the crux of the purpose of this program. Finally, a rather comprehensive discussion of theory and experiment relative to the time-temperature shift phenomena is presented. (Author)

AD-609 817 Div. 10, 25
OTS Prices: HC $1.00/MF $0.50

AeroChem Research Labs., Inc., Princeton, N. J.
ACOUSTIC WAVE-BURNING ZONE INTERACTION IN SOLID PROPELLANTS.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 62.
May 62, 12p AeroChem-TN-43
Contract Nonr347700, ARPA Order23 61

Unclassified report

Descriptors: (*Solid rocket propellants, Acoustic properties), (*Acoustics, Rocket propellants), Sound, Combustion, Noise, Frequency, Solid rocket oxidizers, Particle size.

Installation of guard rings of burning propellant around a burning propellant sample improved the reproducibility of the results in the flame zone amplification experiment. However, more effort is required to make this experiment still more reproducible. Experiments were performed to determine the frequency spectrum of the combustion noise from burning strands of solid propellant. For all propellants tested, composite and double base alike, the sound intensity increased sharply from 1000 cps to a maximum at approximately 3000 cps and then decreased monotonically with frequency beyond 3000 cps. The sole effect of oxidizer particle size was to change the sound intensity level of the spectrum curve, but not its form. (Author)

AD-609 818 Div. 10, 25
OTS Prices: HC $2.00/MF $0.50

AeroChem Research Labs., Inc., Princeton, N. J.
ACOUSTIC WAVE-BURNING ZONE INTERACTION IN SOLID PROPELLANTS.
Special progress rept. for 1 Apr-30 Jul 62.
Sep 62, 34p AeroChem-TP-49
Contract Nonr347700, ARPA Order23 61

Unclassified report

Descriptors: (*Solid rocket propellants, Acoustic properties), (*Acoustics, Rocket propellants), Sound, Combustion, Noise, Combustion products, Exhaust gases, Damping, Additives, Aluminum, Acoustic impedance.

It was determined that the real part of the acoustic admittance of the propellants which were tested must be less in absolute magnitude than the minimum detectable with the present type of experiment (-0.0025/rayls), in which the sound wave makes only one pass through the combustion zone. Additional work toward detecting luminosity waves in the combustion gases from propellants which were being acoustically driven failed to confirm the presence of these waves. It is postulated that the acoustic amplitude was insufficient to produce luminosity waves of detectable amplitude. Experiments indicated that at 1400 cps the acoustic damping constant of propellant combustion product gases is approximately three-fold greater for an aluminized than for a similar non-aluminized propellant. An experiment which has been used by other investigators to study the acoustic damping constant of gases is discussed relative to its possible use to determine the absolute value of the damping constant for the combustion gases at their combustion temperature. (Author)

AD-609 852 Div. 10, 4
OTS Prices: HC $3.00/MF $0.75

Purdue Univ., Lafayette, Ind.
RESEARCH IN NITROMONOMERS AND THEIR APPLICATION TO SOLID SMOKELESS PROPELLANTS.
Annual progress rept. no. 26, 15 Sep 63-14 Sep 64,
by Henry Feuer. 15 Dec 64, 67p
Contract Nonr110013

Unclassified report

See also AD-426 102.

Descriptors: (*Smokeless propellants, Synthesis (Chemistry)), (*Solid rocket propellants, Synthesis (Chemistry)), (*Organic nitrogen compounds, Smokeless propellants), Ketones, Carboxylic acids, Esters, Nitration, Decomposition, Nuclear magnetic resonance, Absorption spectrum, Spectra (Infrared), Spectra (Visible and ultraviolet), Chemical bonds.

The mono-nitration of cyclic ketones with alkyl nitrates in the presence of potassium t-butoxide affords two products, alpha-mononitroketones and omega-nitrocarboxylic esters. The infrared, NMR and ultraviolet spectra of cyclic alpha-nitroketones and of their potassium salts are reported. The reaction of alpha-nitroketones in acidic media was investigated. The major product with the five membered cyclic ketone, 2-nitro-3,5,5-trimethylcyclopentanone is a six membered cyclic

N-hydroxyimide, 2,6-dioxo-3,3,5-trimethyl-1-hydroxy-1-aza-cyclohexane. A study of the ring opening reaction of salts of cyclic alpha, alpha'-dinitroketones to alpha, omega-dinitroalkanes was continued. In the case of alpha, alpha'-dinitrocyclopentanone, dipotassium 2-keto-1,3-cyclopentanedinitronate and potassium 2-keto-3-nitrocyclopentanenitronate are converted to 1,4-dinitrobutane in yields of 71% and 84%, respectively, on treatment with formic acid at pH4. In the case of alpha, alpha'-dinitrocyclohexanone, ring cleavage of dipotassium 2-keto-1,3-cyclohexanedinitronate (I) already occurs with carbon dioxide at about pH6 to give 1,5-dinitropentane (II) in 82% yield; with aqueous acetic acid at pH5 the yield of V amounts to 88%. 2,6-Dinitro-cyclohexanone, a surprisingly stable compund is obtained when pure compound I is treated with hydrogen chloride in anhydrous ether (93.5% yield) or in anhydrous methanol (76% yield).

AD-609 885 Div. 10, 25
OTS Prices: HC $1.00/MF $0.50

Poulter Research Labs., Stanford Research Inst., Menlo Park, Calif.
ACOUSTIC ADMITTANCE OF BURNING SOLID PROPELLANT SURFACE.
Technical operating rept. no. 10, 1 Apr-30 Jun 61. 30 Jun 61, 18p
Contract AF49 638 565, Projs. 4759, PGU2770, Task 2

Unclassified report

Descriptors: (*Solid rocket propellants, Acoustic properties), (*Acoustics, Rocket propellants), Combustion, Mathematical analysis, Theory, Frequency, Shock waves, Oscillographs, Transducers, Sound, Propagation, Recording systems.

Progress is being made in perfecting the proposed single pulse method to a point where it can be employed to obtain the admittance-frequency curve for assorted materials (without combustion in this initial phase of the study). A spark is used to generate a weak shock wave which becomes planar in its travel down a long tube of rectangular cross section. At the end of the tube the wave meets the surface of the solid being tested and is reflected back up the tube. A transducer flush-mounted in the tube picks up the pressure-time profiles of the incident and reflected waves. This information in the form of photographs of the oscilloscope traces is used in the machine calcution of the complex acoustic admittance.

AD-609 886 Div. 10, 25
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
THE STUDY OF THE ORIGIN AND PROPAGATION OF DISTURBANCES IN THE BURNING OF SOLID PROPELLANTS.
Quarterly technical summary rept. no. 17, 1 Jan-31 Mar 63,
by George M. Muller. 30 Apr 63, 16p
Contract AF49 638 565, Proj. PRU2770; ARPA Order 317 62

Unclassified report

Descriptors: (*Solid rocket propellants, Acoustic properties), (*Acoustics, Rocket propellants), Combustion, Sound, Propagation, Recording systems, Oscillographs, Transducers, Instrumentation.

The report deals with the continued investigation of the reflected-pulse method for measuring the normal acoustic admittance of burning propellant surfaces. Work was primarily concerned with problems of instrumentation which must be resolved before meaningful tests with burning propellants can be attempted. A first version of the circuitry for the multi-line recording system was completed. It had been felt for some time that the accuracy of the pulse measurements could be further improved by increasing the number of lines per centimeter on the overlays which are used to provide a vertical scale for reading the oscillograms. A new master grid of 120 lines/cm was obtained, and preliminary tests indicate that it should yield excellent replicas. Problems involving the transducers, (water-cooled microphones with associated amplifiers)were resolved.

AD-609 887 Div. 10, 25
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
THE STUDY OF THE ORIGIN AND PROPAGATION OF DISTURBANCES IN THE BURNING OF SOLID PROPELLANTS.
Quarterly technical summary rept. no. 18, 1 Apr-30 Jun 63,
by George M. Muller. 31 Jul 63, 8p
Contract AF49 638 565, Projs. PRU2770, ARPA Order 317 62

Unclassified report

Descriptors: (*Solid rocket propellants, Acoustic properties), (*Acoustics, Rocket propellants), Combustion, Sound, Propagation, Instrumentation, Recording systems, Mathematical analysis.

The report deals with the continued investigation of the reflected-pulse method for measuring the normal acoustic admittance of burning propellant surfaces (see AD-609 886). Although the multi-line recording system is now operational, the noise level which it introduces into the signal is probably too high in view of the accuracy required for the admittance measurements. A brief discussion of current instrumentation problems is given. Progress was made in organizing some of the theoretical results obtained in the course of this contract.

11. Ground Transportation Equipment

AD-609 753 Div. 11, 33
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE AUTOMOBILE-TODAY AND TOMORROW,
by George A. Hoffman. Jan 62, 30p P-2422
Unclassified report

Paper for presentation at the Annual Meeting of the Highway Research Board, National Academy of Sciences-National Research Council, at Washington, D. C., 9 Jan 62.

Descriptors: (*Passenger vehicles, Systems engineering), Costs, Weight, Effectiveness, Economics, Engines and motors, Vehicle chassis components, Alloys, Composite materials, Automotive industry, Transportation, Statistical analysis, Statistical date, Analysis.

No revolutionary changes in automotive design are foreseen just a continuation of the steep-gradient evolution witnessed so far in passenger cars. The selective consumer preference for the automobile vis-a-vis the rail vehicle will continue undiminished into the foreseeable future. Description of future car components shows slight manufacturing cost increases offset by reduced weight and increased efficiency. If present day costs are used and the usual inflationary adjustments for the next 10 or 20 years applied, a reasonable approximation for over-all automotive costs in the 1970's would be presented. There is proportionately little effort to provide a terminal storage facility for these hordes of future automobiles. The consumer indicates a persistent desire only to minimize total travel time and cost, whether on the ground, in the air, or through space.

AD-609 754 Div. 11, 33
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYSIS OF SOME LAND TRANSPORTATION VEHICLES, TODAY AND TOMORROW,
by R. H. Haase. Aug 62, 28p P-2625 Unclassified report

Prepared for presentation at the Annual Meeting of the Institute of Traffic Engineers (32nd) held at the Denver Hilton Hotel, Denver, Colo., August 13 - 17, 1962.

Descriptors: (*Transportation, Urban planning), (*Passenger vehicles, Urban areas), (*Railroad cars, Urban areas), Traffic, Urban areas, Weight, Costs, Design.

Some of the results of the study are presented as they pertain to the passenger automobile, the transit bus, and the rail rapid-transit car.

AD-609 757 Div. 11, 33
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
AUTOMOBILES; TODAY AND TOMORROW,
by George A. Hoffman. Nov 62, 89p RM-2922-FF
Unclassified report

Sponsored by the Ford Foundation.

Descriptors: (*Passenger vehicles, Systems engineering), Weight, Vehicle chassis components, Engine and motors, Economics, Transportation, Costs, Design, Effectiveness, Traffic, Statistical analysis, Statistical data, Materials, Analysis.

This Memorandum describes the general characteristics of modern automobiles and explores their possible future traits. The present-day passenger car is analyzed by decomposing it into its basic components, such as the body, trim, and engine, and a linear relation is established between each component and over-all vehicle weight. Also categorized are other general properties, both linear with weight, such as capacity, payload, fuel utilization, and economy, and nonlinear, such as dimensions, power utilization, performance, and vehicle utilization. Each of the above components and characteristics is then examined regarding its future possibilities, with not only technological developments but also economic and public-acceptance constraints in mind. From this last analysis, the vehicle of the 1970's is reconstructed into its probable composition, with interactive trends and other factors being computed where possible. (Author)

12. Guided Missiles

AD-609 441 Div. 12, 30
OTS Prices: HC $4.00/MF $1.00

Army Missile Command, Redstone Arsenal, Ala.
THERMAL DESIGN TESTS OF THE IGY SATELLITE. (PAYLOAD FOR MISSILE NO. 16),
by Billy P. Jones. 10 Aug 59, 138p
AMC RA DV TM23 59

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Scientific satellites, Temperature control), (*Temperature control, Satellites (Artificial)), (*Satellites (Artificial), Temperature control), Payload, Thermal insulation, Spacecraft, Effectiveness, Test methods, Test equipment, Tests, Thermal properties, Experimental data, Graphics.

This report presents the results and analysis thermal tests for the IGY Satellite and describes the payload for for Missile No. 16. Included is a detailed description of the test requirements, equipment and procedures. A total of 12 tests were conducted and the results of each are presented separately and summarized. A complete set of temperature versus time graphs are included for each test. (Author)

AD-609 484 Div. 12
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
ERROR ANALYSIS CONSIDERATIONS FOR A SATELLITE RENDEZVOUS,
by W. M. Duke, E. A. Goldberg, and I. Pfeffer.
1959, 13p

Unclassified report

Descriptors: (*Rendezvous trajectories, Errors), (*Satellites (Artificial), Rendezvous trajectories), Trajectories, Ascent trajectories, Descent trajectories, Orbital trajectories, Intercept trajectories, Parking orbit trajectories, Inertial guidance, Rendezvous spacecraft, Terminal guidance, Midcourse guidance, Dynamic programming, Iterative methods, Numerical analysis, Digital computers, Determination, Interceptor spacecraft, Elliptical orbit trajectories, Matrix algebra, Corrections.

The necessity for the achievement of a close satellite rendezvous tactic devolves from a variety of military and space technology requirements. The over-all idea of a rendezvous involves a target and a rendezvous vehicle; the necessity to track the target and compute its ephemeris; a scheme of space kinematics and a means of implementing this scheme via launching and guidance. A completely passive target is presumed. The target must be ground tracked to maintain an up-to-date ephemeris, necessary for exact rendezvous vehicle launch timing and for determination of launch trajectory parameters which will place the rendezvous vehicle in a favorable position for the terminal or homing phase. In considering the magnitude of the possible tracking errors it is noted that, for a passive satellite, skin tracking is mandatory. In view of radar errors it is seen that the accuracy of prediction decreases with prediction time span. A multiple source of radar data can result in major error suppression.

AD-609 501 Div. 12, 16, 18, 20
OTS Prices: HC $3.00/MF $0.75

Mitre Corp., Bedford, Mass.
VULNERABILITY OF MANNED ORBITAL COMMAND POSTS TO NATURAL SPACE RADIATIONS,
by F. W. French and K. F. Hansen. Nov 64, 82p
Mitre TM-4073
Contract AF19 628 2390, Proj. 611.1
ESD TDR64 164

Unclassified report

Descriptors: (*Manned spacecraft, Shielding), (*Shielding, Manned spacecraft), (*Space environmental conditions, Military satellites), (*Radiobiology, Space environmental conditions), Armed forces operations, Command and control systems, Space stations, Orbital trajectories, Vulnerability, Van Allen radiation belt, Solar radiation, Space crews, Radiation tolerance, Dose rate, Models (Simulation), Mathematical analysis.

The shielding requirements for the protection of the crew of a manned orbital command post against the natural space radiations are investigated. Two types of orbits of military importance and of wide applicability are considered--a long-duration, high-altitude orbit above the Van Allen Belt and a short-duration, low-altitude polar orbit below it. Model environments for both orbits in terms of solar flare, cosmic, and Van Allen Belt radiations are postulated. Radiobiological tolerance criteria are investigated, and a somewhat unique criteria, based on partial recovery of sustained somatic damage, is proposed for the long duration mission. A mathematical description of the radiation transport of the separate environmental components through the radiation shield is formulated. Appropriate simplifications are used to obtain expressions for the doses due to primary protons, secondary protons and neutrons, and bremsstrahlung. Calculations are carried out on the IBM 7030 computer to obtain dose vs. thickness curves for different types and amounts of shielding material. These curves, together with the assumed model environment, and the postulated radiobiological tolerance criteria, are used to calculate minimum shielding thicknesses for both types of orbits. Conclusions are then drawn on the total amount of radiation shielding material that must be carried for each orbit. (Author)

AD-609 502 Div. 12, 5, 6
OTS Prices: HC $4.00/MF $0.75

Mitre Corp., Bedford, Mass.
ORBITAL FLIGHT AND COVERAGE SIMULATION,
by L. E. Wilkie and J. W. Stevens. Dec 64, 112p
W-07106/0000/00/0/00
Contract AF19 628 2390, Proj. 611 1
ESD TDR64 156

Unclassified report

Descriptors: (*Space flight, Tracking), (*Orbital trajectories, Simulation), (*Space communication systems, Simulation), Space surveillance systems, Antennas, Earth models, Programming (Computers), Celestial mechanics.

The report is the second of a series describing the current effort towards establishing a workable engineering simulation of the space-ground environment (see also AD-604 865). The report describes the simulation of ground station coverage of a vehicle from the end of powered flight to an arbitrary time in orbit. Signal strengths of several vehicle-ground station antenna combinations, as well as geometrical coverage, are simulated. A spherical earth model was used in the simulation, and the effects of atmospheric drag and orbital perturbations were neglected. (Author)

AD-609 519 Div. 12, 2
OTS Prices: HC $5.00/MF $1.00

Martin Marietta Corp., Denver, Colo.

AN ANALYTICAL STUDY OF THE EFFECTS OF OBLATENESS ON SATELLITE ORBITS,
by Maurice L. Anthony and George E. Fosdick.
Apr 60, 152p Martin-R-60-2

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Planets, Ellipsoids), (*Orbital trajectories, Satellites (Artificial)), (*Numerical analysis, Orbital trajectories), (*Celestial mechanics, Satellites (Artificial)), Inclined orbit trajectories, Circular orbit trajectories, Perturbation theory, Dynamics, Elliptical orbit trajectories, Moment of inertia, Velocity, Gravity, Equations, Motion.

This report contains an analytical study of the short term effects of planetary oblateness on the path of a satellite that is under the sole influence of gravitational attraction. Analytical solutions of the equations of the path, valid to the first order in the oblateness parameter J, are determined following the method of Lindstedt. The initial conditions considered in this report require that the satellite be initially at an apse in the equatorial plane, but the inclination and the eccentricity are unrestricted. Subsequent reports will consider: (1) initial positions not in the equatorial plane; and (2) the escape path from an oblate planet. Both analytical expressions and numerical results are given for the radial position, speed, angular momentum, deviation from the initial plane of motion, rate of nodal regression, and the rate of apsidal advance of a satellite. In addition, the injection speed required for prescribed apses is derived.

AD-609 524 Div. 12, 15
OTS Prices: HC $2.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ALGORITHMS FOR ESTIMATING A RE-ENTRY BODY'S POSITION, VELOCITY AND BALLISTIC COEFFICIENT IN REAL TIME OR FOR POST FLIGHT ANALYSIS.
Group rept.,
by F. C. Schweppe. 3 Dec 64, 47p LL-1964-64
Contract AF19 628 500
ESD TDR64 583

Unclassified report

Descriptors: (*Re-entry vehicles, Radar tracking), (*Numerical analysis, Ballistics), Position finding, Flight speed, Real time, Recursive functions, Equations, Motion, Integration, Linear systems, Data, Matrix algebra.

A general theory of recursive estimation is applied to the particular problem of estimating the time history of a re-entry vehicle's position, velocity and ballistic coefficient from radar measurements of range, elevation, azimuth and range rate. The resulting algorithms have the following properties: (1) Conceptually simple and easy to implement on either general purpose or special purpose computers; (2) Noniterative; (3) Storage requirements independent of amount of data; (4) Extremely fast; capable of real time operation; and (5) A finite memory span; that is, can act like a 'sliding arc' algorithm. Explicit formulae are provided along with general discussions on the basic concept. (Author)

AD-609 573 Div. 12
OTS Prices: HC $2.00/MF $0.50

Training Center for Experimental Aerodynamics, Rhode-Saint-Genese (Belgium).
OPTIMIZATION OF RECOVERY TRAJECTORIES FOR SPACE VEHICLES.
Final scientific rept.,
by L. Moulin. 30 Sep 64, 32p
Grant AF EOAR63 39

Unclassified report

Descriptors: (*Trajectories, Spacecraft), (*Reentry vehicles, Recovery), (*Recovery, Spacecraft), Fuels, Atmosphere entry, Flight paths, Nuclear propulsion, Electric propulsion, Ablation, Acceleration, Thrust, Optimization, Terminal ballistics.

It is shown that optimum recovery conditions must be defined as the ones which minimize an overall dead-weight which must include the fuel for eventual rocket braking outside the atmosphere, and the mass which is ablated for heat protection into the atmosphere. The results indicate that when chemical or nuclear propulsion is considered, pure atmospheric braking will always be the best solution, but when electrical propulsion is used, an optimum compromise between partial rocket and atmospheric braking may exist, depending upon the respective properties of propulsion system and ablating material. (Author)

AD-609 593 Div. 12, 9, 25
OTS Prices: HC $2.00/MF $0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
CALIBRATION OF A PLASMA JET FACILITY FOR SIMULATION OF BALLISTIC MISSILE RE-ENTRY,
by R. R. John and W. L. Bade. 20 Feb 59, 42p
RAD-TR-59-9
Contract AF04 645 30

Unclassified report

Descriptors: (*Plasma jets, Calibration), (*Hypersonic flight, Simulation), (*Reentry vehicles, Stagnation point), Guided missiles (Surface-to-surface), Gas flow, Heat transfer, Aerodynamic characteristics, Thermodynamics, Flight speeds, Hypersonic flow, Shock tubes.

A procedure has been developed for determining the stagnation enthalpy, static enthalpy, stagnation pressure, velocity, and Mach number of a subsonic air plasma jet. The determination is based upon measurements of airflow, power input, and energy losses, and employs the equation of state and an approximate compressible flow equation for dissociated air. The steady state heat transfer rate from the plasma jet to the stagnation region of a large plate has been measured using constant-flow water calorimeters. The range of aerothermodynamic conditions covered in the experiments was as follows: stagnation enthalpy from 3500 to 12,000 Btu/lb, stagnation pressure from 1 to 1.7 atm, stagnation-point velocity gradient from 30,000 to 100,000 sec-1. These conditions simulate flow over the nose regions of high-performance re-entry vehicles for flight velocities between 13,000 and 24,000 ft/sec at altitudes in the neighborhood of 130,000 ft. The observed heat transfer rates ranged from 800 to 1500 Btu/square ft sec. These observed heat flux values were found to agree approximately with a heat transfer correlation for hypersonic flow based upon shock tube experiments. (Author)

AD-609 642 Div. 12, 22
OTS Prices: HC $2.00/MF $0.50

High Velocity Lab., Univ. of Utah, Salt Lake City.
PENETRATION AND CRATERING.
Quarterly progress rept. no. 3.

31 Mar 62, 30p
Contract AF04 647 942

Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Vulnerability), (*Cratering, Meteors), (*Meteors, Guided missiles (Surface-to-surface), (*Terminal ballistics, Meteors), Hypervelocity projectiles, Shock waves, Impact shock, Penetration, Propagation, Rods, Mechanical waves, Deformation, Targets, Projectiles, Recrystallization, Surfaces, Stresses, Mathematical models, Lead, Ablation, Energy, Piezoelectric transducers.

Progress is reported on theoretical and experimental investigations of the phenomena occurring in high-velocity impact. The work is divided into four projects as follows: 1. Investigation of energy distribution in high-velocity-impact cratering. 2. Investigation of flow and wave motion in high-velocity-impact cratering. Development of techniques for measuring wave propagation by means of piezoelectric transducers embedded in targets and by means of surfaee photography continued. An investigation was made of the closing of a subsurface hole during impact. The passage of waves and the subsequent deformation of material could be detected. A preliminary analysis of wave and particle velocities was used to obtain the pressure at the front as a function of depth. 3. Investigation of wave motion in a rod. 4. Investigation of impact in the velocity range of 10-50 km/sec using spray particles. A detection system for observing particle trajectories was completed and tested. A theoretical study of particle trajectories and luminosity was essentially completed.

AD-609 652 Div. 12
OTS Prices: HC $3.00/MF $0.75

Engineering Projects Lab., Mass. Inst. of Tech., Cambridge.
BASIC APPLIED RESEARCH IN FLUID POWER CONTROL.
Progress rept. no. 8, 1 Feb-31 May 64,
by H.H. Richardson, H. A. Leibowitz, A. H. Levis, F. M. Mitchell, and L. H. Mitchell. 3 Sep 64, 94p
DSR-8998-8
Contract AF33 657 7535, Proj. 8226, Task 822604
FDL TDR64 127

Unclassified report

Prepared in cooperation with Chandler-Evans Corp., Hartford, Conn.
See also AD-603 195.

Descriptors: (*Pneumatic servomechanisms, Flight control systems), (*Flight control systems, Pneumatic servomechanisms), Fluid mechanics, Aerospace craft, Control systems, Servomotors, Pneumatic systems, Pneumatic valves, Jets, Fluid flow, Gas bearings, Fluid dynamic properties, Equations, Design.

Technical results are presented and progress is described in several phases of continuing applied research and development related to the design and development of high-performance fluid control devices for advanced aerospace systems. Continued emphasis is placed on pneumatic components and systems which are capable of performing over wide ranges of temperature and in the presence of intense radiation. This report describes current work in the Engineering Projects Laboratory dealing with a new pulse actuation servo system, a pneumatic pulse-length-modulated servo system, the dynamics of fluid jet modulators, electrostatic pure fluid modulation, jet pipe inlet coupling, compressible dampers, and gas-lubricated bearings. (Author)

AD-609 667 Div. 12, 14, 26
OTS Prices: HC $4.00/MF $1.00

Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
SLIP-CAST FUSED SILICA,
by J. D. Walton and N. E. Poulos. Oct 64, 142p
ML TDR64 195

Unclassified report

Descriptors: (*Ceramic materials, Casting), (*Silicon compounds, Oxides), (*Reentry vehicles, Ceramic materials), Refractory materials, Manufacturing methods, Radomes, Nose cones, Ablation, Heat-resistant materials, Heat shields, Test methods, Tests, Thermal insulation, Coating, Halocarbon plastics, Thermal properties, Physical properties, Mechanical properties, Electrical properties, Surfaces, Melting, Radiation damage.

This workbook provides a collection of technical data and information on the slip-cast fused silica work of the Georgia Institute of Technology. It is intended to provide scientists and engineers with thermo-physical, mechanical, electrical, and nuclear properties of slip-cast fused silica. Fabrication techniques and engineering data related to the use of this material for thermal protection systems and radomes are presented. A comprehensive bibliography is also included. (Author)

AD-609 742 Div. 12, 9, 13
OTS Prices: HC $2.00/MF $0.50

Defense Research Lab., Univ. of Texas, Austin.
VIBRATION OF RECTANGULAR AND SKEW CANTILEVER PLATES REPRESENTING IDEALIZED MISSILE FINS,
by M. V. Barton. 14 Dec 49, 34p DRL-222
Contract NOrd9195

Unclassified report

Descriptors: (*Fins, Vibration), (*Guided missiles, Fins), (*Metal plates, Vibration), Aspect ratio, Rectangular bodies, Cantilever beams, Mathematical analysis, Tests.

The Ritz Method is used to determine the vibration characteristics of cantilever plates which represent idealized low aspect ratio missile fins. Natural frequencies and modes are determined for rectangular cantilever plates with cantilever span to breadth ratios of 1/2, 1, 2 and 5, and for skew cantilever plates with sides of equal length and skew angles of 15, 30 and 45 degrees. Some test results are given and correlation with analytical values discussed. (Author)

AD-609 748 Div. 12, 28
OTS Prices: HC $2.00/MF $0.50

Technology, Inc., Dayton, Ohio.
DESIGN AND OPERATION OF A SPACE RENDEZVOUS SIMULATOR.
Rept. for 1 Nov 63-5 Jun 64,
by Robert A. Schmall and Thomas J. Wittmann.
Nov 64, 29p
Contract AF33 615 1125, Proj. 8170, Task 817008
APL TR64 130

Unclassified report

Descriptors: (*Rendezvous spacecraft, Simulators), (*Astronautics, Rendezvous spacecraft), (*Spacecraft, Rendezvous spacecraft), Astronauts, Maneuverability, Rendezvous trajectories, Soft landings, Human engineering, Psychophysiology, Test facilities, Simulation.

A one degree- of-freedom rendezvous simulator was designed and constructed to simulate a 2500-foot rendezvous to determine an astronaut's ability to make a tolerable impact upon a spacecraft when the astronaut is propelled from a first spacecraft by a self-contained, six degree-of-freedom Astronaut Maneuvering Unit (AMU). Conducted in a 270-foot, light-tight photometric tunnel, each run comprised two portions: (1) one with an illuminated target appropriately increasing in size to give the effect of motion while subject and target remained stationary, and (2) the second with the target full size while a light-weight cart carried the target along the tunnel tracks to produce actual motion. Test results from 30 human subjects revealed that AMU's 20-pound retrothrust would be more than adequate to decelerate from the test closing velocities to a tolerable impact. Autokinetic effects causing the appearance of false target movement and other effects, such as those which might result from a stellar background and a subject's having two or more angular degrees of freedom, prompted recommendations for provisions to be incorporated in a future test facility. (Author)

AD-609 750 Div. 12, 1
OTS Prices: HC $6.00/MF $1.25

Cubic Corp., San Diego, Calif.
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME I. SYSTEM DESCRIPTION AND ANALYSIS.
Final rept., vol. 1,
by J. T. Baylor, R. J. Derenthal, J. C. Marlow, A. E. Noyes, and L. A. Morgan. Nov 64, 213p
FER/88-1
Contract AF30 602 3135, Proj. 5933, Task 593302
RADC TDR64 318 V1
Unclassified report

Prepared in cooperation with Smyth Research Associates, San Diego, Calif.

Descriptors: (*Spacecraft, Attitude indicators), (*Attitude indicators, Radio interferometers), Flight control system, Measuring devices (Electrical and Electronic), Radiofrequency, Yaw, Pitch (Motion), Roll, Determination, Electronics, Systems engineering, Feasibility studies.

A feasibility study to design a system for determining vehicle attitute by means of radio frequency techniques was conducted in accordance with the provisions of Exhibit A to PR No. 63-211. Various techniques to perform the attitude determination were evaluated. It was concluded that the use of an inverted interferometer with transmitter installed on the vehicle would meet the system requirements. Using at least two ground stations, the yaw, pitch, and roll axes of the vehicle can be measured to an accuracy of 0.1 degree during the early launch phase. In subsequent phases of flight the accuracy of yaw measurement is reduced. A detailed antenna analysis was provided by Smyth Research Associates on subcontract to Cubic Corporation. This analysis estimates the magnitudes of the measurement errors contributed by the antenna baseline on the vehicle. The operation of the transmitting interferometer is examined in detail in this report and preliminary system design parameters are established. Recommendations are given for areas requiring further study. (Author)

AD-609 751 Div. 12, 1
OTS Prices: HC $6.00/MF $1.50

Cubic Corp., San Diego, Calif.
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME II. DETAILED ANALYSIS OF ANTENNAS, PROPAGATION, POLARIZATION, AND PERFORMANCE.
Final rept., vol. 2,
Nov 64, 293p
Contract AF30 602 3135, Proj. 5933, Task 593302
RADC TDR64 318 V2
Unclassified report

Section 1 was prepared by Smyth Research Associates, San Diego, Calif.
See also AD-609 750.

Descriptors: (*Spacecraft, Attitude indicators), (*Attitude indicators, Radio interferometers), (*Antennas, Flight control systems), Antenna radiation patterns, Propagation, Polarization, Radio transmission, Microwaves, Electronics, Systems engineering, Feasibility studies.

The studies performed were concerned with the antenna constraints which would be placed upon the proposed attitude measurement systems. The three systems under study were: (1) An interferometer, with the baseline on the vehicle itself, consisting of two or more radiators operating at slightly offset frequencies, the phases of which would be compared by the ground station or stations. (2) A system for measuring the polarization of the signal received at the ground and relating this polarization to the orientation of the vehicle. (3) A system which utilizes the amplitude pattern of the transmitted signal to determine the orientation of the vehicle.

AD-609 858 Div. 12, 30
OTS Prices: HC $5.00/MF $1.25

University of Southern California, Los Angeles. Engineering Center.
MODELING CRITERIA AND TESTING TECHNIQUES FOR THE SIMULATION OF SPACE ENVIRONMENTS.
Final rept.,
by John B. Wainwright, Lawrence R. Kelly, Donald A. Wallace, and Thomas H. Keesee. Oct 64, 185p
Contract AF33 657 8737, Proj. 1309, Task 130903
FDL TR64 164
Unclassified report

Descriptors: (*Space environmental conditions, Simulation), (*Spacecraft, Stresses), Planetary atmospheres, Solar radiation, Models (Simulations), Thermal properties, Mechanical properties, Model tests, Mathematical analysis, Distortion, Scale, Measurement, Surfaces, Vibration, Errors, Emissivity.

The report covers an investigation of the possibility of using scale modeling to simulate environmental stresses on a space vehicle. General scaling laws were derived for simulating solar and planetary radiation, reaction jets impinging on a vehicle surface and mechanical vibration. Distortions in the simulated environment such as those produced by imperfect radiation sources, residual test chamber gas and the near presence of chamber walls were evaluated relative to induced measurement errors. Thermal simulation and mechanical vibration experiments are described which were designed to demonstrate the utility of the derived techniques. (Author)

AD-609 880 Div. 12, 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INFLUENCES OF SMALL DIFFERENCES IN BALLISTIC COEFFICIENT OF SATELLITE STATION KEEPING,
by Shih-Yuan Chen. Jan 65, 15p P-3041
Unclassified report

Descriptors: (*Low-orbit trajectories, Perturbation theory), (*Satellites (Artificial), Low-orbit trajectories), (*Perturbation theory, Drift), Circular orbit trajectories, Equations, Motion, Ballistics, Drag, Orbital trajectories, Parking orbit trajectories, Life expectancy.

This note presents the results of an investigation on the drift distance between two satellites caused by a small difference in ballistic coefficient which might be due to differences in weight, frontal area, geometry, and surface roughness. Other perturbing mechanisms, such as the earth's oblateness, variation of earth's gravity field, the gravity effects of the sun and moon, and magnetic field have secondary effects which apply almost equally to each satellite and will therefore be neglected. The present analysis is also limited to circular orbits at altitudes less than 400 mi where atmospheric drag has the dominating effect on orbit decay, and where the effects of solar radiation pressure are also negligible.

13. Installations and Construction

AD-609 503 Div. 13, 25
OTS Prices: HC $3.00/MF $0.75

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
STUDIES ON THE INSTABILITY OF CIRCULAR RINGS,
by Yaakov Elkon. Jun 64, 59p ASRL-TR-119-1
Grant AF AFOSR347 63
AFOSR 64 1843

Unclassified report

Descriptors: (*Rings, Compressive properties), (*Compressive properties, Rings), (*Structural, properties, Rings), Loading (Mechanics), Elasticity, Plasticity, Mechanical properties, Stresses, Strain (Mechanics), Deformation, Failure (Mechanics), Buckling (Mechanics), Mathematical analysis, Structures, Differential equations, Boundary value problems.

The critical loads associated with the instability phenomenon of elastic-perfectly plastic circular rings, which are confined to a rigid boundary and are subjected to end circumferential compressive loads, are determined. Finite-deflection nonlinear theory is employed and two types of imperfections are included in the model; (a) boundary imperfection, (b) an imperfection in the shape of the ring in its initially stress-free state. Comparison with energy methods for the instability analysis is presented and discussed. It is shown that the critical loads are independent of energy considerations and are only related to the magnitude of the imperfection and radius-to-thickness ratio. (Author)

AD-609 506 Div. 13
OTS Prices: HC $4.00/MF $1.00

Martin Marietta Corp., Orlando, Fla.
A METHOD FOR PREDICTING THERMAL RESPONSE IN SANDWICH PANELS,
Final rept. for May 62-May 63,
by P. J. Kendall, J. P. Morgan, and T. E. Chappell.
May 63, 131p OR-2996-1
Contract AF33 657 8649, Proj. 1467, Task 146702
ASD TDR63 306; N63 16996

Unclassified report

Descriptors: (*Sandwich panels, Honeycomb cores), (*Honeycomb cores, Sandwich panels), (*Thermal conductivity, Honeycomb cores), Heat transfer, Heating, Thermal properties, Equations, Matrix algebra, Test methods, Glass textiles, Partial differential equations, Test equipment, Phenolic plastics, Stainless steel, High-temperature research, Theory, Experimental data, Digital computers, Programming (Computers).

This study was undertaken to develop and demonstrate the validity of an analytical model for predicting the transient temperature response in honeycomb sandwich panels subjected to variable heat loads on one or both faces. A one-dimensional analysis was developed which employs the ordinary heat balance considering heat transfer through the panel by conduction, convection, and radiation. The finite (forward) difference technique is employed for solving the heat balance equations. Honeycomb panels of various materials, cell shapes, and dimensions were subjected to a variety of heat loads and their thermal responses were recorded. The predicted thermal responses for these panels, obtained with the analytical model, were in good agreement with the test data. (Author)

AD-609 539 Div. 13, 18
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
MANAGEMENT OF THE RDT and E CYCLE.
Bibliography.
Dec 64, 10p
RSIC 354

Unclassified report

Descriptors: (*Military requirements, Research program administration), (*Research program administration, Bibliography), (*Bibliography, Research program administration), Armed forces research, Operations research, Procurement, Industrial research, Tests.

A short, selective, annotated bibliography is given of the area of management of the research, development, testing, and evaluation cycle, particularly with respect to military items.

14. Materials (Non-Metallic)

AD-609 437 Div. 14, 26
OTS Prices: HC $5.00/MF $1.25

SKF Industries, Inc., Philadelphia, Pa.
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
Final summary rept. for 22 Jun 61-22 Jun 64,
by J. I. McCool, J. A. Martin, W. E. Schmidt, A. J. Schwartz, and Y. P. Chiu. 22 Jun 64, 196p
AL64T067
Contract NOw61 0716C, Proj. XVIII3to6
Unclassified report

Original document contains color other than black and white and is available in limited supply. After present stock is exhausted, it will be available in black and white only.

Descriptors: (*Lubricants, Films), (*Lubrication, Wear resistance), (*Antifriction bearings, Lubrication), (*Ball bearings, Lubrication), Friction, Elasticity, Hydrodynamics, Thickness, Mineral oils, Ethers, Esters, Lubricant additives, Metals, Fatigue (Mechanics), Loading (Mechanics), Surface properties, X rays, Microanalysis, Autoradiography.

A study of elastohydrodynamic lubricant film effects in rolling ball two-ball contacts is presented. Mineral oils, ester base and polyphenyl ether lubricants with and without lubricity additives are studied. Experimental work covers development and application of contact conductivity and X-ray beam transmission measurements for film thickness and profile determination; radiotracer wear rate determination; micro-autoradiography of wear debris and of metal transfer; instrumental analysis of surface microgeometry; and rolling contact fatigue test series. A theory of asperity contact occurrences through a partial film is given. A tentative analysis of wear debris size distribution is given.

AD-609 526 Div. 14, 32
OTS Prices: HC $1.25/MF $0.75

DeBell and Richardson, Inc., Hazardville, Conn.
GLASS/RESIN INTERFACE: PATENT SURVEY, PATENT LIST, AND GENERAL BIBLIOGRAPHY,
by William J. Eakins. Sep 64, 54p
PLASTEC 18
Unclassified report

Descriptors: (*Composite materials, Glass textiles), (*Glass textiles, Laminated plastics), (*Surfaces properties, Glass textiles), (*Patents, Glass textiles), (*Bibliographies, Glass textiles), (*Laminated plastics, Glass textiles), Cleaning, Reinforcing materials, Laminates, Plastics, Indexes, Heat treatment, Coatings, Bonding, Elasticity, Shear stresses.

This report presents a patent survey within three areas pertaining to the glass/resin interface problem, as encountered in the fabrication of glass reinforced plastics. The areas covered are: the sizing of glass fibers, the cleaning of glass strand and fabric, and the use of glass/resin coupling agents. Included is a list of 77 patents and a general bibliography on glass/resin interface consisting of 146 items. (Author)

AD-609 606 Div. 14, 25
OTS Prices: HC $3.00/MF $0.75

Rochester Univ., N. Y.
INFRARED SPECTRA OF METAPHOSPHATE GLASSES.
Technical rept. no. 1,
by Gouq-Jen Su and Chi-kai Shih. Dec 64, 69p
Contract Nonr66819
Unclassified report

Prepared in cooperation with Advanced Research Projects Agency, Washington, D. C.
Doctoral thesis.

Descriptors: (*Phosphate glass, Infrared spectroscopy), (*Infrared spectroscopy, Phosphate glass), Phosphates, Lithium compounds, Sodium compounds, Potassium compounds, Rubidium compounds, Calcium compounds, Strontium compounds, Barium compounds, Alkaline earth compounds, Alkali metal compounds, Bromides, Test methods, Melting, Reflection, X-ray spectroscopy.

The infrared transmission spectra of binary alkali or alkaline-earth metaphosphate glasses have been determined. The glass systems include Li2O.P2O5, Na2O.P2O5, K2O.P2O5, Rb2O.P2O5, CaO.P2O5, SrO.P2O5, BaO.P2O5 and the devitrified K2O.P2O5. Three sampling techniques, namely, the thin film, the KBr-pellet and the reflection have been compared by their infrared spectra in the wavelength 2 to 15 microns. The IR spectra with identical results. Studies have been made on the possible re-orientation of the structure of Na2O.P2O5 glass prepared by extended period of melting, blowing into films and drawing into fibers without change in glass structure. A zigzag chain model of the sodium metaphosphate glass is derived from the X-ray scattering studies by Milberg and Daly Jour. of Chemical Physics (U. S. A.) 3q:2966-2973 (July 1963). Using the Wilson FG-matrix technique, a group theoretical analysis of the model has been carried out, with close agreements between the predicted normal frequencies and observed frequencies.

AD-609 608 Div. 14
OTS Prices: HC $1.00/MF $0.50

Rensselaer Polytechnic Inst., Troy, N. Y.
COMPARISON OF EXTENDED POLYETHYLENE AND CHRYSOTILE ASBESTOS FRACTURE SURFACES.
Technical rept. no. 7,
by Theodore Davidson and Bernhard Wunderlich.
15 Oct 64, 16p
Contract Nonr59119, Proj. NR051 428
Unclassified report

Descriptors: (*Polyethylene plastics, Fracture (Mechanics)), (*Asbestos, Fracture (Mechanics)), Fibers (Synthetic), Fibers (Natural), Minerals, Microstructure, Molecular structure, Crystal lattices, Numerical analysis.

Consideration was given to two substances, chrysotile asbestos and extended-chain polyethylene, which differ widely in their chemical composition and in the size of their fundamental fibrous units. Yet their internal morphology, as evidenced by the structure of their fracture surfaces, shows marked similarity. Although the analysis reported do not prove that fracture in these substances proceeds via a random walk-like propagation mechanism, the fracture surfaces are in agreement with such an assumption. (Author)

AD-609 610 Div. 14, 25, 26, 31
OTS Prices: HC $2.00/MF $0.50

Douglas Aircraft Co., Inc., Santa Monica, Calif.
STUDY OF RESIDUAL STRESSES IN THICK GLASS FILAMENT REINFORCED LAMINATES.

Quarterly progress rept. no. 2, 30 Sep-30 Dec 64,
by F. E. Stone and L. B. Greszczuk. 30 Dec 64,
48p SM-47785
Contract NObs90301, Proj. R007 03 04, Task 1008
Unclassified report

Descriptors: (*Laminated plastics, Filament wound construction), (*Composite materials, Filament wound construction), (*Submarine hulls, Filament wound construction), (*Filament wound construction, Composite materials), (*Glass textiles, Reinforcing materials), Pressure vessels, Stresses, Mathematical analysis, Winding, Heat treatment, Mandrels, Cylindrical bodies, Rings.

The purpose of this program is to determine the presence and magnitude of residual stresses in thick wall fiberglas structures, and their effect on material properties; such that, the information will be applicable to full size deep submergence structures, and detrimental effects may be minimized or eliminated. Residual stresses are reported for eight dispersed construction cylinders and eight all-hoop tape wound rings. Interlaminar shear strength and related trends for the cylinders are included. Four methods for analysis of residual stress are compared, and general orthotropic thermal effects are analyzed. (Author)

AD-609 657 Div. 14, 15, 25
OTS Prices: HC $3.00/MF $0.75

Brown Univ., Providence, R. I., Div. of Applied Mathematics.
MULTIPLE INTEGRAL REPRESENTATION OF MECHANICAL BEHAVIOR OF POLYETHYLENE.
Technical rept. no. 10,
by J. M. Lifshitz. Dec 64, 55p
Contracts Nonr56230, SD86, Proj. NR064 450
Unclassified report

Descriptors: (*Polyethylene plastics, Mechanical properties), Viscoelasticity, Creep, Deformation, Loading (Mechanics), Shear stresses, Strain (Mechanics), Nonlinear systems, Mathematical models, Integrals.

The response of viscoelastic solids to quasi-static loading, under conditions where non-linear theories have to be used, was investigated. Creep measurements of tension and of torsion in polyethylene specimens are described. Step loading was used and the deformations were measured optically by means of travelling microscopes for the tension experiments and by the reflection of light beams from mirrors for the torsion experiments. The deformations were too large for the theory of linear viscoelasticity to hold and the constitutive relations used were of multiple integral form; some of the kernels involved were determined. It was found that for the loading range used, two kernels were sufficient for describing pure shear deformations and three kernels were required for tension. It was also shown that in this non-linear region, the relation between shear stress and shear strain depended on whether or not dilatational stresses were present. (Author)

AD-609 663 Div. 14, 11, 22
OTS Prices: HC $1.25/MF $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
PRESERVATIVE TREATMENT OF WOOD FOR COMBAT VEHICLES.
Final rept.,
by John P. Hill. 7 Dec 64, 43p
Proj. 1C024401A328
CCL 172 Unclassified report

Descriptors: (*Wood, Preservation), (*Moisture proofing, Wood), Vehicle chassis components, Environmental tests, Specifications, Impregnation, Paints, Army equipment.

Ninety-six simulated truck floor, comprising a total of 328 wood specimens, were prepared and exposed outdoors for three years. Seventy-five were treated at controlled retention and maximum penetration, using proprietary type and experimental preservatives, sixteen pressure treated to refusal, and five untreated. All specimens were finished with two-coat systems consisting of a new experimental olive drab oil-alkyd wood primer plus various specification topcoats. Three year exposure results indicated that the controlled retention maximum penetration treatment cycles, combined with the experimental primer and preservative contributed to a substantial improvement in outdoor durability. This report includes proposed specifications for the laboratory developed preservative and primer. (Author)

AD-609 665 Div. 14, 4, 25
OTS Prices: HC $0.75/MF $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
THE ENERGETICS OF MICELLAR SOLUBILIZATION, AN ACTION OF THE DETERGENCY MECHANISM.
Final rept.,
by A. Mankowich. 30 Nov 64, 24p
Proj. 1C024401A328 Unclassified report
CCL 171

Descriptors: (*Surface-active substances, Thermodynamics), Cleaning compounds, Solubility, Adsorption, Energy, Entropy, Dyes.

Micellar solubilization, an action of the detergency mechanism, is considered from the standpoint of quasi-thermodynamics. The basis of the approach was suggested by the similarity of micellar solubilization and Freundlich adsorption isotherms. Free energy change (DG), heat of solubilization (DH), and change in entropy (DS) for the micellar solubilization of Orange OT are calculated using two-phase theory and the Gibbs-Helmholtz equation. It is postulated that the dye concentration in the solution (monomer) phase is that at the critical micelle concentration. The dye concentration in the solubilized phase is computed for the dye-penetrated portion of the micellar volume. Calculated values of DG in anionic and nonionic surfactants are of the order of magnitude of a physical adsorption. The positive DH values indicate the process is not an adsorption. The positive DS values point to increased randomness or possibly to decreased energy effects due to iceberg water molecule structure surrounding the hydrophobic dye molecules. The loss of the water structure around the latter in the solubilization process would result in their acquiring increased configurational entropy. (Author)

AD-609 696 Div. 14, 22
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
CERAMICS; THEIR ROLE IN WEAPONRY.
Monograph series,
by C. E. Rust. 24 Apr 60, 12p
WAL MS17
Unclassified report

Presented to KERAMOS, National Professional Ceramic Engineering Fraternity Biennial Convocation at Bellevue Stratford Hotel, Philadelphia, Pa.

Descriptors: (*Ceramics materials, Weapons), Symposia, History, Materials.

AD-609 708 Div. 14, 31
OTS Prices: HC $2.00/MF $0.50

Naval Research Lab., Washington, D. C.
A NAVY ANALYSIS OF GLASS REINFORCED PLASTICS FOR HYDROSPACE APPLICATIONS,
by J. A. Kies. Nov 64, 39p
Unclassified report

Presented at Northeastern States Navy Research and Development Clinic, Philadelphia, Pa. Nov. 19, 1964.

Descriptors: (*Glass textiles, Reinforcing materials), (*Plastics, Filament wound construction), (*Pressure vessels, Composite materials), (*Composite materials, Pressure vessels), (*Filament wound construction, Pressure vessels), Fibers, Fatigue (Mechanics), Tensile properties, Fracture (Mechanics), Shear stresses, Moisture, Porosity, Bubbles, Reviews.

Recent advances and remaining problems in the study of filament-wound glass reinforcing plastics are reviewed. Areas considered are fatigue studies, shear and tensile cracking, equal tensioning of fibers, port reinforcement, lay-up patterns, moisture effects, fiber properties, mechanical damage, and effects of porosity or bubbles in the resin. Emphasis is given to application to shells for manned deep submergence vehicles.

AD-609 770 Div. 14, 27
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
FILAMENT-WINDING PLASTICS. PART 2. ROLE OF THE RESIN IN GLASS-FIBER-REINFORCED STRUCTURES UNDER TENSILE STRESS,
Interim rept.,
by F. S. Whisenhunt, Jr. 1 Dec 64, 18p
Proj. SPO WW014
NRL 6161
Unclassified report

Descriptors: (*Filament wound construction, Composite materials), (*Composite materials, Filament wound construction), (*Glass textiles, Reinforcing materials), (*Epoxy plastics, Filament wound construction), Aging (Materials), Amines, Rupture, Pressure vessels, Rocket cases, Plastics, Winding, Stresses, Molecular structure, Plastics, Filaments, Reliability, Tensile properties.

A study was conducted on amine-cured epoxy resins and the effects on the ultimate burst strength of internally loaded glass-reinforced filament-wound vessels when these resins were used as the plastic matrices. The tensile properties of the matrix were changed by systematically altering the molecular structure of the amine-cured epoxy resin. It was found that resin tensile properties had an insignificant effect on the ultimate burst strength of a well-designed and well-fabricated vessel. However, it was also found that a matrix of good tensile properties improved the reliability of the burst pressure by providing a healing effect on minor winding errors. The glass stresses at burst of the test vessels were 400,000-psi range, which is about the ultimate tensile strength of bundles of 'E' glass. A summary discusses the state of the art and unsolved problems relevant to the plastic matrix in glass-reinforced filament-wound vessels. In particular, the deleterious effect of voids on externally loaded structures and the necessity of removing these voids is discussed. (Author)

AD-609 779 Div. 14, 25
OTS Prices: HC $1.00/MF $0.50

Bausch and Lomb, Inc., Rochester, N. Y.
INFRARED COATING STUDIES.
Quarterly rept. no. 2, 18 Aug-18 Nov 64,
by A. F. Turner, T. P. Martin, and L. Chang. 18 Nov 64, 25p
Contract DA44 009AMC124T
Unclassified report

Descriptors: (*Infrared filters, Coatings), (*Crystals, Reflection), Infrared optical materials, Films, Barium compounds, Lithium compounds, Calcium compounds, Strontium compounds, Fluorides.

The report contains theoretical computations of the reststrahlen enhancement of four crystals: BaF2, LiF, CaF2 and SrF2. It previously was shown that certain film combinations were suitable not only for increasing the reststrahlen reflectance of both crystals and films but also for suppressing secondary side band reflectance peaks on the short wavelength side of the reststrahlen band. The design analysis of these film combinations was extended to show that with proper film indices the reflectance on the long wave length side of the reststrahlen band may at the same time also be substantially reduced. The reflectance curves calculated for the four above mentioned crystals are essentially rectangular in shape and thus present attractive reflection filtering possibilities for the far infrared in regions where the required absorption free filming materials are available.

AD-609 821 Div. 14, 17, 31
OTS Prices: HC $6.00/MF $1.50

Proteus, Inc., Whippany, N. J.
PROPERTIES OF BUOYANT MATERIALS AND STRUCTURES.
Final rept.,
by J. Irgon, C. Juhasz, D. Z. Lippmann, M. Armstrong, and M. P. Stoltenberg. 15 Aug 64, 254p
Contract Nonr427100
Unclassified report

Descriptors: (*Materials, Buoyancy), (*Floating bodies, Physical properties), Floats, Liquids, Solids, Gases, Honeycomb cores, Structures, Structural shells, Coatings, Plastics, Lithium, Density, Solubility, Elastomers, Foams, Wood, Ceramic materials, Metals, Spheres, Alloys, Composite materials, Glass textiles, Filament wound constructions, Submarine hulls, Concrete, Laminates, Partial differential equations, Sound transmission, Density, Vapor pressure.

This report is directed at furnishing information on the various kinds of materials which can be employed for the construction of flotation devices, a description of typical float structures comprised of the materials listed and generalized mathematical relations for calculating the buoyancy and related parameters of a structure in any form and combination of materials. The data are restricted to properties that are most frequently employed in design and analytical studies and for which reasonably reliable values can be obtained.

AD-609 842 Div. 14, 25
OTS Prices: HC $1.00/MF $0.50

Optics Technology, Inc., Belmont, Calif.
LONG WAVELENGTH INFRARED FIBER OPTICS.
Interim engineering rept. no. 2, 16 Sep-15 Dec 64,
by N. S. Kapany and R. J. Simms. Dec 64, 16p
Contract AF33 615 1952, Proj. 4056, Task 405603
Unclassified report

Descriptors: (*Fiber optics, Infrared radiation), (*Infrared optical materials, Fiber optics), Glass,

Germanium, Selenium, Arsenic, Antimony, Tellurium, Silicon, Light transmission, Glass textiles, Fibers, Drawing (Machine processing), Manufacturing methods.

A description is given of the concentric crucible design developed for this contract. The results of several fiber draws are reported. The glasses used have been arsenic-sulphur (As-S), arsenic-selenium-tellurium (As-Se-Te) and germanium-arsenic-tellurium (Ge-As-Te) glasses. One As-Se-Te glass was shown to be adequate but shortcomings were found in the stability of the other glasses selected from the last two types. Several flexible bundles have been fabricated using As-S coated fibers and As-Se-Te uncoated fibers. Techniques for fabricating short flexible bundles were investigated. During the third quarter, additional glass samples will be drawn and the resultant fibers and components evaluated. (Author)

AD-609 882 Div. 14, 4, 25
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE THERMODYNAMICS OF THE POLYAMIDE RESIN (NYLON-6): CARBON-HYDROGEN-OXYGEN-NITROGEN VAPOR SYSTEM.

Memo rept.,
by F. J. Krieger. Jan 65, 35p RM-4404-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Nylon, Thermodynamics), Polyamide plastics, Thermal properties, Carbon, Hydrogen, Oxygen, Nitrogen, Enthalpy, Entropy, Temperature, Pressure, Molecular weight, Tables.

The purpose of this study is the thermodynamic investigation of polyamide resin (Nylon-6) over a range of temperatures up to 6000K and pressures up to 100,000 atmospheres. Two sets of equilibrium composition equations are used--one representing a pure gas phase, the other a heterogeneous system of gas and solid carbon. The gas phase of the heterogeneous chemical system, like the homogeneous gas phase, comprises 90 gaseous carbon-hydrogen-oxygen-nitrogen species. The results of the computational program are presented in both tabular and graphic form. The latter is a conventional Mollier diagram in which specific enthalpy is plotted against specific entropy, with cross plots of temperature, pressure, and molecular weight. (Author)

15. Mathematics

AD-609 476 Div. 15
OTS Prices: HC $1.00/MF $0.50

Mitre Corp., Bedford, Mass.
THE MINIMUM NUMBER OF LINEAR DECISION FUNCTIONS TO IMPLEMENT A DECISION PROCESS,
by H. Joksch and D. Liss. Dec 64, 13p
TM-03903
Contract AF19 628 2390, Proj. 707 0
ESD TDR64 171

Unclassified report

Descriptors: (*Decision theory, Linear programming), (*Linear programming, Decision making), Probability, Convex sets, Equations, Mathematical logic, Functions, Classification, Set theory.

This document determines a lower limit on the number of linear decision functions necessary to place a certain number of objects into a certain number of categories. This lower limit is a function of the number of parameters necessary to describe each object and the number of categories. (Author)

AD-609 498 Div. 15
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
PATHS IN POLYHEDRA. II,
by Victor Klee. Oct 64, 31p Boeing-Math-373, D1-82-0383

Unclassified report

Also available from the author.

Descriptors: (*Geometric forms, Linear programming), (*Linear programming, Geometric forms), Operations research, Iterative methods.

The paper is motivated in part by a hypothesis of Saaty (Operations research, 12 (1964), p. 159-161) concerning the paths in polyhedra which are produced by variants of the simplex algorithm. An analysis of his hypothesis and some of its relatives leads to the study of four different types of paths in a polyhedron P and to estimates for the length of each type in terms of the dimension and number of facets of P. Of special interest are the W sub v paths, which never return to a facet from which they have earlier departed. It is conjectured that for an arbitrary nondegenerate linear programming problem and an arbitrary choice of an initial vertex of the feasible region P, there is a sequence of admissible pivots (improving the value of the objective function at each stage) which leads by means of a W sub v path to a critical vertex of P. The conjecture is proved for the case in which P is of dimension three. (Author)

AD-609 507 Div. 15, 30
OTS Prices: HC $2.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa.
Graduate School of Industrial Administration.
GENERALIZED CUTS IN DIOPHANTINE PROGRAMMING,
by Fred Glover. Oct 64, 35p ONR-RM-132
Contract NONR76024, Proj. NR047 048

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Linear programming, Theory), (*Numerical analysis, Linear programming), Corrections, Numbers, Theorems, Calculus of variations, Inequalities, Algebra, Equations, Sequences.

Using the tools of the bound escalation method for solving integer linear programs, the author derives in a simple and direct fashion a two parameter family of constraints which must be satisfied by any nonnegative integer solution to a specified equation. As a byproduct of the derivation, the Gomory inequalities may be generated from the generalized constraints by setting one of the parameters equal to infinity. Special attention is given to the class of derivative constraints called cuts, which cannot be satisfied by every non-integer solution to the original constraints. Theorems are proved which specify how to generate various types of cuts, such as those which are always at least as strong as the Gomory cuts, and those with a maximum number of coefficients of a different sign than in the Gomory cuts. Examples of cuts constructed to exhibit some of these properties are presented in later sections of the paper. (Author)

AD-609 560 Div. 15
OTS Prices: HC $2.00/MF $0.50

Stanford Univ., Calif.
PREFERENCE, CREDENCE, AND UTILITY,
by Richard C. Jeffrey. 1964, 42p
Grant AF AFOSR529 64
AFOSR 64 2498

Unclassified report

To be published as chap. 1 in Studies in Inductive Logic and Probability. Rudolf Carnap, ed. 1964.

Descriptors: (*Decision theory, Mathematical logic), (*Probability, Game theory), Transformations (Mathematics), Matrix algebra, Set theory, Decision making, Reasoning.

Topics covered in this report include: Bayesian deliberation; Bayesian preference rankings; Preference-preserving utility transformations; Gambles, quantization, and boundedness, and Unicity.

AD-609 571 Div. 15
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
PATHS IN POLYHEDRA. I,
by Victor Klee. Oct 64, 34p D1-82-0382, Boeing-math-372

Unclassified report

Also available from the author. See also AD-411 312, AD-609 498.

Descriptors: (*Geometric forms, Linear programming), (*Linear programming, Geometric forms), Linear programming, Convex bodies, Convex sets, Combinatorial analysis, Numerical analysis, Geometry.

Further study was made into the behavior of paths in polyhedra relative to the number of facets. Section I, on longest simple paths and circuits, asserts that polytopes which are 'polar' (or 'combinatorially dual') to the cyclic polytopes all admit Hamiltonian circuits. This leads to a sharp upper bound for the lengths of simple paths admitted by polyhedra of given dimension and having a given number of facets. Section II is devoted to the conjecture that any 2 vertices of a polyhedron can be joined by a path therein which never returns to a facet from which it has departed earlier. The

conjecture is proved for 3-dimensional polyhedra, and a stronger form (dealing with polyhedral cell complexes) is established for special cases.

AD-609 586 Div. 15
OTS Prices: HC $1.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
A CLASS OF LINEAR PROGRAMMING PROBLEMS REQUIRING A LARGE NUMBER OF ITERATIONS,
by Victor Klee. Nov 64, 25p D1-82-0387, Boeing-Math-375
Unclassified report

Also available from the author.

Descriptors: (*Linear programming, Iterative methods), (*Iterative methods, Linear programming), Mathematical programming, Numerical methods and procedures, Operations research.

A coordinate-free description of the simplex algorithm (for nondegenerate linear programming problems) is supplied, and is used to show that the number of iterations can be larger than was previously known. For $0 < m < n$, there is constructed a nondegenerate linear programming problem whose bounded $(n - m)$-dimensional feasible region is defined by means of m linear equality constraints in n nonnegative variables, and in which, after starting from the worst choice of an initial feasible vertex, $m(n - m - 1) + 1$ simplex iterations are required in order to reach the optimal vertex. It is conjectured that this is the maximum possible number of iterations (for arbitrary $0 < m < n$), but the conjecture is proved only for $n < m + 4$. (Author)

AD-609 588 Div. 15
OTS Prices: HC $3.00/MF $0.75

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
TABLES FOR THE STUDENTIZED LARGEST CHI-SQUARE DISTRIBUTION AND THEIR APPLICATIONS,
by John V. Armitage and P. R. Krishnaiah.
Aug 64, 96p
Proj. 7071, Task 7071 01
ARL 64 188
Unclassified report

Descriptors: (*Statistical distributions, Tables), (*Tables, Statistical distributions), (*Integrals, Probability), Analysis of variance, Statistical functions.

Let x sub 1,...,x sub K be K independently distributed chi-square variates with n degrees of freedom and let x sub 0 be another chi-square variate with m degrees of freedom distributed independently of the other x sub i's. Then, the distribution of u = mxmax/nx sub 0 where xmax = max (x sub 1,...,x sub K), is known to be the studentized largest chi-square distribution. In this report, two methods are proposed to evaluate the probability integral of u. Using one of these methods, upper 10%, 5%, 2.5% and 1% points of the distribution of u are tabulated for K = 1(1)12, n = 1(1)19 and for different values of m. Various applications of these tables are also discussed. (Author)

AD-609 601 Div. 15
OTS Prices: HC $2.00/MF $0.50

Arcon Corp., Lexington, Mass.
REAL TIME COMPUTATION OF CONFIDENCE ELLIPSOIDS,
by Arthur Albert. Dec 64, 39p
Contract Nonr440100, Proj. RR003 04 01
Unclassified report

Descriptors: (*Statistical analysis, Real time), (*Ellipsoids, Statistical analysis), Matrix algebra, Analysis of variance, Statistical distributions, Statistical tests, Stochastic processes.

AD-609 614 Div. 15
OTS Prices: HC $1.00/MF $0.50

Columbia Univ., New York.
TOPICS IN ANALYSIS. THEORETICAL MATHEMATICS.
Final technical rept. for 1 Oct 63-30 Sep 64,
by Harold Rosenberg. 30 Sep 64, 3p
Grant Nonr G00011 64
Unclassified report

Descriptors: (*Game theory, Algebraic topology), (*Algebraic topology, Game theory), Theorems, Mathematical analysis, Algebraic geometry.

AD-609 649 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A DYNAMIC PROGRAMMING APPROACH TO THE NONPARAMETRIC PROBLEM IN THE CALCULUS OF VARIATIONS,
by Leonard D. Berkovitz and Stuart E. Dreyfus.
Dec 64, 41p RM-4329-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Dynamic programming, Calculus of variations), (*Calculus of variations, Dynamic programming), Operations research, Adaptive control systems, Real variables, Mathematical analysis, Functional analysis, Integrals, Partial differential equations, Theorems, Optimitation, Theory, Set theory, Equations, Mathematical programming.

This memorandum presents an approach to the nonparametric simple problem of the calculus of variations that is in the spirit of dynamic programming. Under the assumptions that the functions that define minimizing curves exhibit a certain regularity in their behavior, differentiability properties of the optimal value function W are determined. Then the fundamental partial differential equation of dynamic programming is obtained, and the necessary conditions of the calculus of variations, with the exception of Jacobi's condition, are deduced as immediate corollaries. (Author)

AD-609 654 Div. 15
OTS Prices: HC $1.00/MF $0.50

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
SIMULTANEOUS TESTS FOR TREND AND SERIAL CORRELATIONS FOR GAUSSIAN MARKOV RESIDUALS,
by P. R. Krishnaiah and V. K. Murthy. Oct 64, 19p
Proj. 7071, Task 707101
ARL 64 186
Unclassified report

Prepared in cooperation with Douglas Aircraft Co., Santa Monica, Calif.

Descriptors: (*Statistical processes, Statistical tests), (*Statistical tests, Statistical functions), Analysis of

variance, Stochastic processes, Statistical distributions, Simultaneous equations.

In this report, exact tests are proposed for testing the trend in the presence of autocorrelation and also for testing the trend and autocorrelation simultaneously in a first order Markov process. Also, the simultaneous confidence intervals associated with these tests are derived. These results are extended to h-th order Markov process. (Author)

AD-609 656 Div. 15
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THEORY OF ERROR OF THE RUNGE-KUTTA METHOD,
by A. A. Kurmit. Dec 64, 22p
RSIC 343; TT 65 60557
Unclassified report

Trans. of Leningrad Univ. Vestnik (USSR) 1963, v. 18, no. 19, Seriya Matematiki, Mekhaniki i Astronomii, no. 4, p. 35-48.

Descriptors: (*Numerical methods and procedures, Errors), (*Differential equations, Numerical analysis), Functions, Real variables, Complex numbers, Matrix algebra, Inequalities, Vector analysis, Theorems, USSR.

AD-609 687 Div. 15
OTS Prices: HC $1.00/MF $0.50

Washington Univ., Seattle.
ABSOLUTE EQUIVALENCE OF EXTERIOR DIFFERENTIAL SYSTEMS.
Technical rept. no. 23,
by Harold H. Johnson. Dec 64, 11p
Contract Nonr47715, Proj. NR043 186
Unclassified report

Descriptors: (*Differential geometry, Theory), (*Algebraic topology, Differential geometry), Invariance, Partial differential equations, Mappings (Transformations), Sequences.

This paper concerns an equivalence relation first defined by E. Cartan for certain systems of ordinary differential equations. He called two systems absolutely equivalent if they had isomorphic prolongations. The author extends Cartan's definition to general exterior differential systems. Two exterior differential systems are absolutely equivalent if there exists a sequence of systems beginning with one and ending with the second in which for each adjacent pair one is a partial prolongation of its neighbor. Two kinds of numerical invariants are found, depending on the characters s sub o, s sub 1, . . ., s sub p. Using Kuranishi's infinite analytic mappings, the last non-zero integer among s sub o, s sub 1, . . . s sub p is an absolute invariant. Other absolute invariants are computed from the sequence of prolongations of a given system.

AD-609 692 Div. 15
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Inormation Center, Redstone Arsenal, Ala.
RUNGE-KUTTA TYPE PROCEDURES OF ORDER OF ACCURACY n + 4 (n>2) WITH THREE NODES FOR NUMERICAL INTEGRATION OF FIRST-ORDER DIFFERENTIAL EQUATIONS,
by A. Cotiu. Dec 64, 14p
RSIC 341; TT 65 60566
Unclassified report

Trans. of Institutul Politehnic, Cluj. Buletinul Stiintific (Rumania) 1962, v. 5, p. 39-49.

Descriptors: (*Integration, Differential equations), (*Differential equations, Integration), (*Numerical methods and procedures, Integration), Numerical analysis, Sequential analysis, Transformations (Mathematics), Determinants, Iterative methods, Integrals.

By transformation, E. Fehlberg reduced integration of a first-order differential equation: dz/dx=F(x,z), with initial condition: z(x sub 0) =z sub 0, to integration of another first-order differential equation. This allows the establishment of Runge-Kutta type operations of sixth-order accuracy for numerical integration of the transformed differential equation. In the first part of this paper the Fehlberg transformation is extended to allow the establishment of Runge-Kutta procedures of eighth-order accuracy with three nodes for numerical integration of the transformed differential equation. Then the above transformations are generalized to permit establishment of Runge-Kutta procedures of order of accuracy n+4 (n>or =2) with three nodes for numerical integration of the transformed differential equation. The nodes and coefficients in the formulas used for application of these procedures are rational numbers.

AD-609 772 Div. 15, 12, 19
OTS Prices: HC $1.00/MF $0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
DIFFERENTIAL GAMES AND OPTIMAL PURSUIT-EVASION STRATEGIES,
by Yu-Chi Ho, A. E. Bryson, Jr., and S. Baron.
4 Nov 64, 14p Cruft-TR-457
Contract Nonr186616, Proj. NR372 012
Unclassified report

Descriptors: (*Game theory, Calculus of variations), (*Calculus of variations, Game theory), (*Guided missile trajectories, Proportional navigation), (*Proportional navigation, Calculus of variations), Guidance, Navigation, Evasion, Interception, Rendezvous guidance, Pursuit courses, Optimization, Analysis of variance, Matrix algebra, Boundary value problems.

In this report, we show that variational techniques can be applied to solve games with differential constraints. Conditions for capture and for optimality are derived for a class of optimal pursuit-evasion problems. Results are used to demonstrate that the well known 'proportional navigation law' is actually an optimal intercept strategy. (Author)

AD-609 777 Div. 15, 25
OTS Prices: HC $1.00/MF $0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
AN EXPONENTIALLY CONVERGENT AND FINITE ALGORITHM FOR LINEAR INEQUALITIES,
by Yu-Chi Ho and R. L. Kashyap. Oct 64, 10p
Cruft-TR-454
Contract Nonr186616, Proj. NR372 012
Unclassified report

Research supported in part by the Joint Services Electronics Program and by Honeywell, Inc., Boston, Mass.

Descriptors: (*Iterative methods, Linear programming), (*Linear programming, Least squares method), (*Inequalities, Numerical methods and procedures), Mathematical programming, Linear systems, Control systems, Optimization, Operations research, Matrix algebra, Vector analysis, Pattern recognition.

An exponentially convergent and finite algorithm is presented which provides a rule of procedure for solving a fundamental problem in pattern classification, threshold switching theory, and mathematical programming. This problem is finding the m-vector x, such that Ax > 0, where A is a given Nxm matrix with N >> m.

AD-609 826 Div. 15
OTS Prices: HC $2.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
ON THE RELATION BETWEEN ORDINARY AND STOCHASTIC DIFFERENTIAL EQUATIONS,
by Eugene Wong and Moshe Zakai. 11 Aug 64, 37p ERL-64-26
Grant AF AFOSR139 64

Unclassified report

Descriptors: (*Differential equations, Stochastic processes), (*Stochastic processes, Differential equations), Integrals, Probability, Equations, Inequalities, Sequences, Series, Statistical functions, Theorems, Vector analysis, Analysis of variance, Motion.

The following problem is considered in this paper: het x sub't be a solution to the stochastic differential equation: dx sub t = m(x sub t, t)dt + S(x sub t, t) dy sub t where y sub t is the Brownian motion process. het the nth derivative of x sub t be the solution to the ordinary differential equation which is obtained from the stochastic differential equation by replacing y sub t with the nth derivative of y sub t where this derivative is a continuous piecewise linear approximation to the Brownian motion and converges to y sub t as n approaches infinity. If x sub t is the solution to the stochastic differential equation (in the sense of Ito) does the sequence of the solutions converge to x sub t. It is shown that the answer is in general negative; it is, however, shown that the nth derivative of x sub t converges in the mean to the solution of another stochastic differential equation which is given.

AD-609 835 Div. 15, 16
OTS Prices:HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NUMERICAL INTEGRATION OF A DIFFERENTIAL-DIFFERENCE EQUATION WITH A DECREASING TIME-LAG,
by R. E. Bellman, J. D. Buell, and R. E. Kalaba.
Dec 64, 16p RM-4375-NIH
Grant PHS GM09608 03

Unclassified report

Descriptors: (*Chemotherapy, Differential equations), (*Integration, Differential equations), (*Differential equations, Numerical analysis), (*Difference equations, Differential equations), Time-lag theory, Biology, Blood circulation, Cardiovascular system, Iterative methods, Programming (Computers).

Systems in which variable time-lags are present are of common occurrence in biology. Variable flow rates are a common cause of these variable lags. At present no extensive body of knowledge exists concerning the effects which these variable lags can cause. In this first memorandum it is shown how to reduce some differential-difference equations to ordinary differential equations which can then be studied numerically with ease. Subsequent memoranda will deal with situations in which multiple-lags and lags dependent on the solution itself are present. New types of phenomena which are important for the qualitative understanding of such systems are to be discussed later. (Author)

AD-609 864 Div. 15
OTS Prices: HC $3.00/MF $0.50

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
ALGORITHM FOR SOLVING VOLTERRA INTEGRAL EQUATIONS MET IN PROCESS IDENTIFICATION.
Master's thesis,
by Edward P. C. Hsieh. Aug 64, 52p ESL-R-209
Grant DA ARO D31 124G193, Proj. DSR8942
AROD 3365 2

Unclassified report

Descriptors: (*Integral equations, Numerical methods and procedures), (*Control systems, Optimization), (*Optimization, Linear systems), Errors, Numerical analysis, Identification, Control systems, Matrix algebra, Digital computers, Mathematical programming, Linear programming, Automatic.

This report is concerned with the development of an effective solution to the problem of the determination of the impulse response of a physical system as applied to the problem of identification of process dynamics in adaptive control systems. With input command signals whose characteristics are changing with time, an optimal control of the process can be achieved most effectively by altering the control characteristics at appropriate instants during the length of the operation. A general approach to the problem is chosen so that complete identification is obtained using only the normal input signals without relying on the injection of test signals. An effective procedure has been developed to process these measured data to obtain the entire impulse response. The proposed procedure, with some modifications and generalization of concepts, can be applied to the problem of designing the impulse response of an optimum linear system using minimum mean squared error criterion. (Author)

AD-609 866 Div. 15
OTS Prices: HC $2.00/MF $0.50

Minnesota Univ., Minneapolis.
AN IMBEDDING OF CLOSED RIEMANN SURFACES IN EUCLIDEAN SPACE,
by Adriano M. Garsia. 1960, 31p
Contract AF49 638 857
AFOSR TN60 1266; PB 153 433

Unclassified report

Descriptors: (*Algebraic topology, Theorems), (*Topology, Algebra), (*Complex variables, Topology), Conformal mapping, Complex variables, Mapping (Transformations), Mathematical models, Inequalities, Measure theory.

The following theorem is proved: Every compact Riemann surface has a conformally equivalent smooth model in 3-dimensional Euclidean space.

16. Medical Sciences

AD-609 443 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval School of Aviation Medicine, Pensacola, Fla.
COMPARATIVE HISTOLOGICAL STUDY OF THE REINFORCED AREA OF THE SACCULAR MEMBRANE IN MAMMALS.
Joint research rept. no. 101,
by Makoto Igarashi. 14 Oct 64, 17p
Proj. MR005 13 6001, NASA Order R93, Task 1
Unclassified report

Conducted under the sponsorship of the Office of Life Science Programs, National Aeronautics and Space Administration, Washington, D. C.

Descriptors: (*Ear, Histology), (*Vestibular apparatus, Histology), (*Membranes (Biology), Histology), Sensory mechanisms, Tissues (Biology), Cells (Biology), Wounds and injuries, Mammals, Primates.

The reinforced area of the saccular membrane is probably a structure protecting the macular end organ. An attempt has been made to investigate and compare this structure microscopically in 65 mammalian inner ears, including those of man. A definite reinforced area of the saccular membrane existed in all of the human ears examined. Its existence was also demonstrated in all of the squirrel monkey ears studied; however, some of these showed narrow or questionable formations. The ears of all the four-legged mammals investigated, on the other hand, showed no reinforced area except those of the flying squirrel. It is possible that, as a stimulus receptor, the function of the saccule in primates differs from that of the saccule in lower mammals. (Author)

AD-609 444 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval School of Aviation Medicine, Pensacola, Fla.
QUANTITATIVE INTERPRETATION OF THE EXERCISE ELECTROCARDIOGRAM. USE OF COMPUTER TECHNIQUES IN THE CARDIAC EVALUATION OF AVIATION PERSONNEL.
Research rept. no. 3,
by Raphael F. Smith. 4 Nov 64, 21p
Proj. MR00513 7004, Task 8
Unclassified report

Rept. includes Appendix 'A Statistical Proof of the Unity Vector Analysis', by Robert J. Wherry, Jr.

Descriptors: (*Electroencephalography, Mathematical analysis), (*Cardiovascular diseases, Diagnosis), Heart, Pathology, Test methods, Statistical methods, Vector analysis, Medical equipment, Analog computers, Digital computers, Aviation personnel, Epidemiology.

In aviation medicine a missed diagnosis of coronary heart disease is associated with increased danger to the pilot in flight while a false-positive error results in the loss of a highly trained man from operational flying. Exercise stress tests improve the sensitivity of the ECG as a method of detecting coronary heart disease, but a high diagnostic error ratio has been found with currently accepted methods. This report describes a system of quantitating ECG changes after exercise which utilizes a special purpose analog computer (integrator) and calculation of mean VCG parameters by digital computer. Synchronizing circuitry automatically adjusts the period of integration for changes of heart rate. The vectorcardiographic response to stress of a group of patients with mild symptomatic coronary disease is compared to a normal control group. Highly significant changes in the direction of the T vector appear three minutes after exercise and allow separation of the normal subjects from the patients with coronary disease. The quantitative output of this system is being used in an epidemiological approach to the problem of coronary disease in the aviator. (Author)

AD-609 453 Div. 16, 28
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
A SIMPLE LINEAR MODEL FOR VOWEL PERCEPTION,
by Edward C. Carterette. 15 Oct 64, 5p
Contract Nonr23358
Unclassified report

Prepared for presentation at the Symposium on Models for the Perception of Speech and Visual Form, 11-14 Nov 64, Boston, Mass.

Descriptors: (*Speech, Perception), (*Auditory perception, Model tests), Speech recognition, Mathematical models, Hearing, Perception (Psychology), Model theory.

This work had two major aims. One was to obtain sufficient data to make reliable estimates of confusions among vowels after ideal filtering. The other was to compare the responses of the same listeners to real vowels and their synthetic aliases. Beyond their inherent interest, these data are valuable in assessing vocal analog systems whether as practical devices or as research tools and speech standards. A simple, quantitative model is presented and tested against the perceptual data from real and synthetic talkers.

AD-609 481 Div. 16, 28
OTS Prices: HC $5.00/MF $1.00

RCA Service Co., Inc., Camden, N. J.
TECHNIQUES OF PHYSIOLOGICAL MONITORING. VOLUME III. SYSTEMS.
Rept. for Jul 63-Aug 64,
by Richard W. Alnutt and Walter C. Becker.
Oct 64, 157p
Contract AF33 657 9252, Proj. 7222, Task 722203
AMRL TDR62 98, V3
Unclassified report

See also AD-426 816.

Descriptors: (*Monitors, Physiology), (*Space medicine, Instrumentation), (*Viability, Stress (Physiology)), Adaptation (Physiology), Data processing systems, Telemeter systems, Telemetering data, Space flight, Magnetic recording systems, Medical equipment, Cardiography, Electroencephalography, Blood pressure, Respiratory system, Cardiovascular system, Muscles, Central nervous system, Medical research, Circuits, Human engineering, Maintenance, Safety, Data, Galvanic skin response.

The volume is devoted to a discussion of monitoring systems. While the applications of physiological monitoring are many and varied, the primary concern here is with viability monitoring, the use of a measurement system to obtain factual, quantitative information about the physiological responses of a subject in a stressful environment, in order to plan protective measures which will ensure the safety and functional capability of that subject in such environments. Included are a description of instrumentation required for the measurement of

individual physiological parameters, a discussion of related problems in system design, including simultaneous measurement of several parameters, data transmission or telemetry, and the use of magnetic tape recording as a system adjunct. Basic guidelines of system trouble-shooting and interference reduction are also included. Section IV contains a brief survey of additional measurement techniques and data handling considerations which, while not state of the art or standard practice, will undoubtedly affect the field of physiological monitoring in the near future. (Author)

AD-609 511 Div. 16
OTS Prices: HC $1.00/MF $0.50

Eye Research Foundation, Bethesda, Md.
RETINAL SENSITIVITY DURING PHOTOPIC ADAPTATION.
Final rept. for 1 Nov 58-31 Oct 64.
1 Jan 65, 6p
Contract Nonr275000

Unclassified report

Descriptors: (*Retina, Photosensitivity), (*Eye, Adaptation (Physiology)), Visual perception, Light, Stimulation, Visual signals, Biophysics, Vision, Reviews.

AD-609 624 Div. 16, 20
OTS Prices: HC $2.00/MF $0.50

Argonne Cancer Research Hospital, Chicago, Ill.
THE CONSEQUENCES OF INGESTION BY MAN OF REAL AND SIMULATED FALLOUT,
by George V. LeRoy, John H. Rust, and Robert J. Hasterlik. 1963, 36p ACRH-102
Contracts AT11 1 69, OCD OS62 214

Unclassified report

Descriptors: (*Radiation effects, Radioactive fallout), (*Metabolism, Fission products), (*Fission products, Absorption), Gastrointestinal system, Excretion, Nuclear particles, Radioactive isotopes, Labeled substances, Tracer studies, Oral, Injection (Medicine), Dosage, Nuclear radiation spectrometers, Solubility, Cesium, Barium, Strontium, Simulation, Humans.

Real and simulated particulate fallout and solutions of Sr85Cl2 and Cs(134)Cl2 were fed to 102 healthy volunteers. Absorption and retention of ingested radioactivity was measured by whole body counting using the gamma-ray spectrometer at the Argonne Cancer Research Hospital. An average of 3 per cent of the radioactivity of week-old local fallout was absorbed: the range was 0 to 9 per cent. Strontium and cesium leached or dissolved from simulated fallout behaved in the same way, metabolically, after absorption as they did when the tracer was swallowed in a solution or injected intravenously. The large number of subjects studied provided additional information on the range of variation of intestinal motility, biological availability of strontium, cesium and barium following ingestion of fallout, and retention of the radionuclides of these elements. (Author)

AD-609 732 Div. 16
OTS Prices: HC $0.75/MF $0.50

Harry Diamond Labs., Washington, D. C.
HUMAN BREATHING PARAMETERS AND COMMERCIAL AUTOMATIC RESPIRATORS,
by H. H. Straub and G. Thompson. 1 Jun 64, 24p
Proj. 31000
HDL TM64 23

Unclassified report

Descriptors: (*Respirators, Design), (*Physiology, Respirators), Automatic, Artificial respiration, Respiration, Medical equipment, Lungs, Volume, Pressure, Gas flow.

During periods of inadequate human respiration, artificial ventilation can satisfactorily assume the function of the patient's breathing mechanisms in most situations. Such ventilation can be administered by mouth to mouth techniques, manual methods, or automatic devices. The purpose of this report is to discuss the physiological parameters governing the design of automatic respirators and to review the design of those currently in use. (Author)

AD-609 790 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CERTAIN PHYSIOLOGICAL SHIFTS IN THE HUMAN ORGANISM DURING ACCLIMATIZATION IN THE INTRACONTINENTAL REGIONS OF ANTARCTICA,
by I. I. Tikhomirov. 2 Dec 64, 16p
FTD TT64 286; TT 65 60590

Unclassified report

Unedited rough draft trans. of Akademiya Meditsinskikh Nauk SSSR. Vestnik, 1962, v. 17, no. 3, p. 74-82.

Descriptors: (*Acclimatization, Polar regions), (*Polar regions, Adaptation (Physiology)), Barometric pressure, Hypoxia, Physical fitness, Medical examination, Stress (Physiology), Fatigue (Physiology), Pathology, Stress (Psychology), Cardiovascular diseases, Respiration, Metabolism, Hemoglobin, Blood counts, USSR.

In the central regions of Antarctica man falls into extremely difficult and unusual conditions: very low temperatures coexist with low atmospheric pressure and the polar night. To study the effect of these local conditions on the human organism, observations were conducted on those who wintered at the intracontinental stations, Vostok 1 in 1957 and Vostok 2 in 1959.

AD-609 827 Div. 16, 12
OTS Prices: HC $1.00/MF $0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS. PART A. BIOSCIENCES: COMPILATION OF ABSTRACTS.
Rept. no. 21.
30 Dec 64, 18p
ATD P64 66; TT 65 60593

Unclassified report

Rept. on Surveys of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Space biology, Life support), (*Life support, Reviews), Space medicine, Physiology, Closed ecological systems, Algae, Metabolism, Drugs, Abstracting, USSR.

Abstracts of items in the following fields are given: space medicine and biology, space physiology, and space vehicle ecology.

AD-609 860 Div. 16
OTS Prices: HC $1.00/MF $0.50

Institute for Tuberculosis Research, Univ. of Illinois, Chicago.

INJURY OF THE SKIN.
Annual progress rept., suppl., 1 Sep 63-29 Feb 64,
by Sol Roy Rosenthal, George Crouse, and Wilma A. Spurrier. 29 Feb 64, 12p
Grant Nonr0002264, Proj. NR102 628

Unclassified report

Addendum to Thermal Injury of the Skin, annual progress rept. for 1 May 62-1 May 63, AD-412 549.

Descriptors: (*Skin, Thermal radiation), (*Tissue extracts, Toxicity), Burns, Mice, Humans, Tissues (Biology), Wounds, and injuries, Toxins and antitoxins, Blood plasma, Coagulation, Temperature, Injection (Medicine).

Homogenates prepared in 96C saline are more consistently lethal than are homogenates prepared in 22C saline, and about 27% by weight more of the cold homogenates is required to produce death in mice. In general the treatments to which the homogenates were subjected gave results consistant with the idea that clot accelerating properties but with lethal capabilities can be isolated also indicates that thromboplastin is not the lethal compound in the homogenates. (Author)

AD-609 863 Div. 16
OTS Prices: HC $3.00/MF $0.75

North American Aviation, Inc., Los Angeles, Calif.
MOMENTS OF INERTIA AND CENTERS OF GRAVITY OF THE LIVING HUMAN BODY ENCUMBERED BY A FULL-PRESSURE SUIT.
Final rept. for Jul-Dec 63,
by J. DuBois, W. R. Santschi, D. M. Walton, C. O. Scott, and F. W. Mazy. Nov 64, 62p NA-64-527
Contract AF33 657 11619, Proj. 7184, Task 718408
AMRL TR64 110

Unclassified report

Descriptors: (*Astronauts, Pressure suits), (*Pressure suits, Astronauts), (*Center of gravity, Astronauts), Moment of Inertia, Human engineering, Anthropometry, Anatomy, Body, Humans, Weightlessness, Posture, Respiration, Air force personnel, Oxygen consumption, Respiration, Statistical data, Correlation techniques.

The center of gravity and the moments of inertia of each of 19 male subjects, representative in stature and weight of the U. S. Air Force population, were determined. Two body positions: sitting and relaxed; and three modes of dress: nude, suited-unpressurized, and suited-pressurized were investigated. The theoretical accuracy of the experimental procedures, based on a compound pendulum, ranged from 2 to 8 percent, depending on body position and axis. The moments of inertia were found to vary significantly between body positions and between nude and suited conditions. Correlation coefficients between the moments of inertia and stature and weight exceeded 0.9. Fifty anthropometric dimensions and frontal and profile photographs were obtained on each subject to serve as the basis for additional biodynamic analyses. (Author)

17. Metallurgy

AD-609 451 Div. 17
OTS Prices: HC $0.75/MF $0.50

Watervliet Arsenal, N. Y.
A STUDY OF THE EFFECT OF SOLIDIFICATION IMPERFECTIONS ON THE TENSILE PROPERTIES OF CAST STEEL.
Technical rept.,
by Bruce L. Bramfitt and Leonard Liuzzi. Sep 64, 28p
WVT 6420

Unclassified report

Descriptors: (*Steel, Castings), (*Castings, Porosity), Radiography, Metal plates, Statistical analysis, Fractography, Gases, Heat treatment, Least squares method, Mechanical properties, Tensil properties.

The need for a correlation between mechanical properties and imperfection size as determined by radiographic standards has greatly increased. This investigation was initiated to establish such a correlation with cast 4140 steel heat treated to a strength level of 180,000 to 200,000 psi. Solidification imperfections of both gas and shrinkage-type were studied. A least squares statistical regression analysis has shown that tensile strength decreases linearly as imperfection size increases. No significant difference between the two types of imperfections in reducing the tensile strength was noted. From the results of this investigation a practical method can be devised for establishing radiographic standards for castings. (Author)

AD-609 459 Div. 17, 4
OTS Prices: HC $2.00/MF $0.50

Southern Research Inst., Birmingham, Ala.
A STUDY OF THE DIFFUSIVITY OF IRON IN LIQUID SLAGS.
Final rept. for 1 Jan 59-31 Dec 62,
by Edward B. Dismukes. 4 Feb 63, 28p
SRIB-5737-1054-XIII
Contract AF49 638 523,
AFOSR 4493

Unclassified report

Descriptors: (*Iron, Diffusion), (*Slags, Iron), Calcium, Silicates, Heat of activation, Liquids, Calcium compounds, Oxides, Iron compounds, Silicon compounds, Dioxides, Measurement.

The self-diffusion coefficients of iron and calcium in silicate melts were measured. These data and comparable data in the published literature do not fully support some of the currently held theories of the structure of silicate melts. The diffusivity of iron, for example, seems to have a surprisingly high energy of activation, and further information is needed concerning the diffusivity. The exchange of iron between solid metal and molten iron silicate was also studied. This phenomenon creates difficulties in determining the diffusivity of iron when it is necessary, as in this study, to use the metal iron as the material of construction for diffusion vessels. (Author)

AD-609 554 Div. 17
OTS Prices: HC $1.00/MF $0.50

Army Materials Research Agency, Watertown, Mass.
DEVELOPMENT OF A STRUCTURAL URANIUM ALLOY,
by Jacob Greenspan and F. J. Rizzitano.
Sep 64, 13p
AMRA TR64 28

Unclassified report

Descriptors: (*Uranium alloys, Structural properties), Molybdenum alloys, Niobium alloys, Zirconium alloys, Titanium alloys, Density, Tensile properties, Shock resistance, Hardness, Fracture (Mechanics), Elasticity, Microstructure, Heat treatment.

A uranium alloy is described, giving data on mechanical behavior and how it is affected by certain variations in alloy content and thermal history. The range in property values thus presented was considerable. The work described is associated with possible applications of depleted uranium for structural purposes. (Author)

AD-609 611 Div. 17, 25
OTS Prices: HC $2.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
METALLURGICAL ASPECTS OF GaAs-Ge HETERO-JUNCTIONS.
Technical rept.,
by R. S. Mroczkowski, M. C. Lavine, and H. C. Gatos.
Dec 64, 29p
Contracts Nonr396305, SD-90

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Semiconductors, Phase studies), (*Metallography, Semiconductors), Germanium, Gallium alloys, Arsenic alloys, Eutectics, Crystal structure, Solubility, Crystal lattice defects, X-ray diffraction analysis, Electron microscopy, Microstructure, Surface properties.

The structure of GaAs-Ge heterojunctions prepared by a back melting process was studied by X-ray diffraction, metallographic and electron micro-analyzer techniques. The boundary region between the GaAs and the Ge was found to consist of a four-layered band. A discontinuity between the two inner bands was brought about by solidification occurring simultaneously from the GaAs and the Ge side. The junction material on either side of the central discontinuity was found to have grown as a single crystal with the orientation of the parent substrate. It was found essential to determine the GaAs-Ge phase diagram. This was accomplished by a series of alloys containing 0 to 40 weight percent GaAs. Over this range the diagram is a simple eutectic with the eutectic point at 74 weight percent Ge and 845C. The limiting solubility of GaAs in Ge was found to be less than 5 weight percent. The Kossel divergent beam X-ray technique was used to study orientation relationships across the boundary layer. (Author)

AD-609 618 Div. 17
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
CORROSION OF METALS IN TROPICAL ENVIRONMENTS. PART 6. ALUMINUM AND MAGNESIUM.
Interim rept.,
by C. R. Southwell, C. W. Hummer, Jr., and A. L. Alexander. 1 Dec 64, 20p
Proj. RR007 08 44 5506
NRL 6105

Unclassified report

Descriptors: (*Aluminum alloys, Corrosion), (*Magnesium alloys, Corrosion), (*Corrosion, Tropical tests), Metals, Corrosion-resistant alloys, Environmental tests, Liquid immersion tests, Sea water, Water, Tensile properties, Fouling.

The corrosion resistance of three alloys of aluminum and two alloys of magnesium has been studied following exposure up to 16 years in five natural tropical environments. These include sea-water immersion, fresh-water immersion, and exposure to tidal sea water, a tropical marine atmosphere, and a tropical inland atmosphere. Aluminum 1100, aluminum alloy 6061-T, and magnesium alloy AZ31X were exposed to each of the environments listed. In addition, Alclad aluminum 2024-T and magnesium alloy AZ61X were exposed to the two tropical atmospheres. Weight loss, pitting, and change in tensile properties were measured to show the extent of corrosion for each of these materials. Aluminum alloys demonstrate extremely high resistance to each environment, with the exception of tropical fresh water, in which case serious pitting occurred. Alloy 6061-T demonstrated some superiority in all environments to aluminum 1100. (Author)

AD-609 651 Div. 17, 30
OTS Prices: HC $1.00/MF $0.50

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COMPUTER ANALYSIS OF THE HEAT FLOW IN THE VACUUM ARC MELTING OF MOLYBDENUM,
by Pierre du Manoir and Cyril M. Pierce.
Oct 64, 19p
Proj. 7351, Task 735101
ML TDR64 308

Unclassified report

Descriptors: (*Molybdenum, Refining (Metallurgy)), (*Heat transfer, Molybdenum), (*Programming (Computers), Heat transfer), Grain structures (Metallurgy), Electric arcs, Vacuum, Numerical analysis, Power, Coolants, Melting, Programming languages, Refractory metals.

A Fortran computer program was created to analyze the transient heat flow situation which results on arc melting a 3 1/2-inch diameter molybdenum ingot in a water-cooled copper mold. The effects of several process variables on the time varient ingot temperature distribution were then investigated. The numerical analysis indicated that a finer grain structure can be achieved when the power input is maximized and that the use of maximum power and warm (200 - 400C) coolants should result in greater metal purification. (Author)

AD-609 666 Div. 17, 14, 25
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
TEMPERATURE-STRAIN RATE AND THE BRITTLE FRACTURE PROBLEM.
Monograph series,
by Joseph I. Bluhm. 29 Dec 58, 10p
WAL MS5

Unclassified report

Descriptors: (*Metallography, Brittleness), (*Brittleness, Fracture (Mechanics)), (*Fracture (Mechanics), Brittleness), Structures, Temperature, Strain (Mechanics), Stresses, Failure (Mechanics), Quality control, Metals, Mechanics.

If a complex structural configuration is impacted and energy absorption measured as a function of temperature, it will generally be observed, particularly with steel components, that a transition in the behavior takes place with test temperature. At high test temperatures, considerable energy is absorbed and fibrous fracture occurs; at low test temperatures, little energy is absorbed and the fracture is very brittle. The transition region over which this change takes place may cover a wide or narrow temperature range. This general behavior pattern characterizes the so-called brittle behavior problem. Design attempts against brittle behavior are presented.

AD-609 673 Div. 17, 22, 26
OTS Prices: HC $2.00/MF $0.50

Watertown Arsenal Labs., Mass.
U. S. ARMY REQUIREMENTS FOR TITANIUM ALLOYS WITH RESPECT TO VEHICULAR APPLICATIONS. ALPHA-BETA TITANIUM ALLOY.
Monograph series,
by S. V. Arnold. 1 May 59, 41p
WAL MS3

Unclassified report

Prepared in cooperation with Army Tank-Automotive Center, Warren, Mich.

Descriptors: (*Titanium alloys, Military requirements), (*Armored vehicles, Titanium alloys), Costs, Vehicles, Army, Ordnance, Metal plates, Machining, Welding, Manufacturing methods, Specifications, Tables.

A survey is made of the problems which beset use of titanium in vehicles. Information is presented regarding experiences with regard to the costs of procuring titanium and fabricating prototypes over the past several years. Comparisons of estimated costs for titanium vs. steel and/or aluminum in a light armor vehicle application are included.

AD-609 689 Div. 17, 22
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
THE EFFECT OF SPECIMEN GEOMETRY ON DETERMINATION OF ELONGATION IN SHEET TENSILE SPECIMENS.
Monograph series,
by Eric B. Kula and Norbert H. Fahey. 18 Aug 60, 24p
WAL MS11

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Test methods, Tensile properties), (*Copper, Tensile properties), (*Steel, Tensile properties), Ordnance steel, Tool steel, Ductility, Sheets, Metal plates, Physical properties, Geometric forms.

A study was made of the effect of specimen gage length, width and thickness on the elongation as determined in a tensile test. Hard-drawn copper, annealed copper, 1020 steel, and H 11 steel were studied. Although a number of relationships have been proposed to explain the variation of elongation with gage length, the results show that no one relationship adequately describes the course of the curves. The elongation in 2 inches is found to vary approximately linearly with the specimen area on a log-log plot, showing agreement with Templin's equation. The reason for the dependence of elongation on specimen area rather than width-to-thickness ratio, can be seen from a study of the local width, thickness and longitudinal strains.

AD-609 706 Div. 17,
OTS Prices: HC $3.00/MF $0.75

ManLabs., Inc., Cambridge, Mass.
MECHANICAL BEHAVIOR OF INTERMETALLIC COMPOUNDS,
Rept. for 15 Sep 63-15 Sep 64,
by E. T. Peters, J. J. Ryan, I. Vilks, and L. E. Tanner. 1 Dec 64, 96p
Contract AF33 657 7432, Proj. 7350, Task 735001
ASD TDR62 1087 P3
Unclassified report

Descriptors: (*Intermetallic compounds, Aging (Materials)), (*Aging (Materials), Intermetallic compounds), Vanadium alloys, Cobalt alloys, Nickel alloys, Mechanical properties, Temperature, Time, Crystal structure, Microstructure, Hardness, Transformations, Resistance (Electrical), Measurement, Microscopy, Alloys, Metallography, X-ray diffraction analysis.

The aging behavior of the intermetallic compounds VCo3, VNi3, and VNi2 was investigated as a function of temperature, time, and composition. The disordered high-temperature structure of all compounds is f.c.c., and the ordered structures existing at lower temperatures are hexagonal, tetragonal and orthorhombic, respectively. Room temperature microhardness measurements were obtained from stoichiometric specimens of the three compounds initially quenched from the disordered state to aging temperatures of 400, 600, and 800C, and from several off-stoichiometric composition specimens of VCo3 and VNi3 aged at 600C. In addition, electrical resistivity and hot hardness measurements were obtained as a function of temperature for the stoichiometric compositions. The structures developed in these specimens by aging were defined by light microscopy and X-ray diffraction analysis and, for VNi3 by transmission electron microscopy. The observed hardness values obtained as a function of aging time are discussed in terms of crystallographic structure, transformation mechanism, microstructure, and the degree of long range order. (Author)

AD-609 727 Div. 17, 12, 26
OTS Prices: HC $1.00/MF $0.50

IIT Research Inst., Chicago, Ill.
VANADIUM ALLOY STUDIES.
Bimonthly rept. no. 5, 1 Oct-30 Nov 64,
by F. C. Holtz. 11 Dec 64, 16p IITRI-B6021-5
Contract NOw64 0239c, Proj. 6021
Unclassified report

Descriptors: (*Vanadium alloys, Creep), Niobium alloys, Tantalum alloys, Titanium alloys, Boron alloys, Carbon alloys, Hafnium alloys, Silicon alloys, Rolling (Metallurgy), Forging, Tensile properties, Hardness, Elasticity, Density, Rupture, Heat treatment, Heat-resistant metals and alloys.

This program is concerned with the development of vanadium alloys having improved short-time creep properties at temperatures up to 2400F. The alloy V-40Cb-30Ta-1Ti and this base complexed with various combinations of boron, carbon, hafnium, and silicon were readily cold rolled after thermal homogenization of the arc-melted ingots; in some cases a 2400F press forging operation was required for initial ingot breakdown. Most of the compositions exhibited twinning when deformed at room temperature, and unusually high room-temperature strength and ductility were obtained--the alloy containing 0.23 wt% Si and 0.075 wt% C had a density-corrected ultimate strength of 650,000 psi/(lb/in3), with 24% elongation. Addition of 1.5 wt% Hf and 0.075 wt% C produced a substantial increase in the 2200F creep resistance of the V-40Cb-30Ta-1Ti base. (Author)

AD-609 739 Div. 17
OTS Prices: HC $2.00/MF $0.50

Metallurgical Research Labs., Syracuse Univ., N. Y.
CRACK INITIATION IN METALLIC MATERIALS.
Quarterly progress rept. no. 3,
by V. Weiss, G. Nash, and K. Schroder. Oct 64, 33p MET.E1160-1064-QP3
Contract NOw64 0275d
Unclassified report

Descriptors: (*Fracture (Mechanics), Alloys), (*Stainless steel, Fracture (Mechanics)), (*Titanium alloys, Fracture (Mechanics)), Loading (Mechanics), Heat treatment, Chromium alloys, Molybdenum alloys, Nickel alloys, Aluminum alloys, Vanadium alloys, Stresses, Strain (Mechanics), Fatigue (Mechanics).

Crack initiation and propagation data for AISI 301 stainless, RS-120 (annealed), and PH-15-7Mo in the RH-1050 and the CH-900 conditions under alternating load is presented and analyzed using a new crack propagation law. The constants n and N sub 0, relating to crack propagation and initiation resistance which appear in this relation are evaluated for each material and specimen geometry. The constant n is found to be related to the strain hardening coefficient of the material and its values have been found to be a good indication of the material's susceptibility to crack re-initiation. The constant N sub 0 is found to correspond to the crack initiation times for sharp notch specimens but for the mold notch specimens, the meaning of N sub 0 on the material, the specimen geometry, and the applied stress level is obtained from the test data. (Author)

AD-609 766 Div. 17, 7
OTS Prices: HC $2.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
CORROSION INVESTIGATIONS, TRACY-RED BLUFF, CALIFORNIA, EHV DIRECT-CURRENT TESTS.
Laboratory rept.,
by T. E. Backstrom. 15 Sep 64, 32p ChE-34
Unclassified report

Descriptors: (*Underground structures, Corrosion), (*Corrosion, Underground structures), Metals, Corrosion inhibition, Voltage, Electrodes, Interference, Pipes, Direct current, Transmission lines, Electrical networks, Ground (Electrical), Electric currents, Environmental tests, Anodes, Cathodes, Rectifiers.

Test measurements were made to determine the maximum distance from the two types of electrodes at which corrosion prevention procedures would be necessary for protecting buried metallic structures. It was concluded that the use of EHV d-c ground return at current levels used in tests would: 1/ promote serious corrosion of buried metalwork in Area 1 (within approximately 1/2-mile radius of the electrode) if a ground mat electrode were used and mild corrosion if a deep-well electrode were used; 2/ promote negligible to serious corrosion of buried pipelines in Area 2 (1/2-3 mile radius of either a ground mat or deep-well electrode) depending upon (1) the distance of the pipelines from the electrode (2) the geometry of the two electrode-pipeline systems and (3) the horizontal extent of the pipelines; 3/ impress no significant stray currents

on buried pipeline in Area 3 beyond approximately a 3-mile radius of the electrode. Normal corrosion prevention techniques are fully adequate to prevent stray current corrosion of buried metalwork if proper location of the electrode is made. These conclusions must be modified to reflect the anticipated time-current product. (Author)

AD-609 783 Div. 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INFLUENCE OF ALLOYING ON THE HARDNESS OF NiAl AND ITS SOLID SOLUTIONS,
by L. A. Kucherenko, V. A. Troshkina, and K. B. Khomyakov. 22 Dec 64, 7p
FTD TT64 1270; TT 65 60583

Unclassified report

Unedited rough draft trans. of Moscow Univ. Vestnik. Seriya 2: Khimiya (USSR) 1964, v. 19, no. 1, p. 53-55.

Descriptors: (*Alloys, Phase studies), (*Nickel alloys, Hardness), (*Aluminum alloys, Hardness), Manganese alloys, Iron alloys, Cobalt alloys, Copper alloys, Solid solutions, Heat treatment, Metallurgy, Temperature, Microstructure, Grain structures (Metallurgy), USSR.

An evaluation is made of the role of small amounts of additives Mn, Fe, Co, and Cu with regard to the hardness of NiAl of stoichiometric composition and its solid solutions of defective structure, to which are referred Al and NiAl, with defects of the type of empty places and solid solution of Ni in the NiAl, with defects of the type of atoms of replacement.

AD-609 798 Div. 17
OTS Prices: HC $2.00/MF $0.50

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTRICAL RESISTIVITY OF NIOBIUM-ZIRCONIUM ALLOYS BELOW 273.2K,
Rept. for 1 May 62-1 May 64,
by Donald J. Evans. Nov 64, 34p
Proj. 7367, Task 736703
ML TDR64 234

Unclassified report

Master's thesis.

Descriptors: (*Niobium alloys, Resistance (Electrical)), (*Zirconium alloys, Resistance (Electrical)), (*Resistance (Electrical), Niobium alloys), Low-temperature research, Cryogenics, Measuring devices (Electrical and Electronic), Experimental data, Temperature, Calibration, Impurities, Least squares methods, Circuits.

An apparatus for measuring the electrical resistivity of materials from 4.2K up to 273.2K was constructed and used to test niobium zirconium alloys of the following compositions: Nb + 15% Zr, Nb + 25% Zr, Nb + 33% Zr, and Nb + 50% Zr. It was found that the temperature dependence of the electrical resistivity in these alloys is approximately linear, with Matthiessen's Rule holding for the lower concentrations. The residual electrical resistivity is shown to depend linearly on zirconium concentration. (Author)

AD-609 815 Div. 17, 26
OTS Prices: HC $3.00/MF $0.75

Climax Molybdenum Co. of Michigan, Detroit.

STUDIES OF REFRACTORY ALLOY SHEET MATERIALS,
Final rept. for 15 Mar 63-15 Dec 64,
by Robert Q. Barr and M. Semchyshen. 31 Dec 64, 90p
Contract NOw62 0419c

Unclassified report

See also AD-422 106.

Descriptors: (*Refractory metals and alloys, Material forming), (*Molybdenum alloys, Sheets), (*Tungsten alloys, Sheets), Niobium alloys, Titanium alloys, Zirconium alloys, Carbon alloys, Heat treatment, Aging (Materials), Recrystallization, Tensile properties, Creep, Rupture, Transition temperature, Deformation, Density, Surface properties, Degradation, Rolling (Metallurgy), Extrusion, Microstructure, Fractography.

Pilot lots of 0.05-in.-thick sheet were rolled from ingots of the following compositions: (1) Mo + 1.59% Cb + 0.52% Ti + 0.21% Zr + 0.068% C, (2) Mo + 1.30% Ti + 0.35% Zr + 0.093% C, (3) W + 3.10% Mo + 0.04% Zr + 0.001% C. The use of solution or solution and aging thermal treatments at the extruded billet stage (prior to rolling to sheet) markedly increased the recrystallization temperature and the elevated-temperature tensile and creep-rupture strengths of the two molybdenum-base alloys. Tensile strengths of 55,000 psi at 3000 F and 13,600 psi at 3500 F were observed for the tungsten-base alloy. The W-Mo-Zr alloy sheet exhibited higher strength:density ratios at 3000 F than any of the molybdenum-base alloys evaluated. Creep-rupture strengths of both molybdenum- and tungsten-base alloy sheet materials were affected by reactions between the specimen surfaces and the test atmosphere (<.0004 torr). The molybdenum-base alloys experienced measurable decarburization during tests at 2400 and 3000 F.

AD-609 829 Div. 17, 25, 26, 30
OTS Prices: HC $2.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
MAGNETIC PROPERTIES OF ELECTRODEPOSITED NICKEL-IRON-COBALT FILMS,
by Stanley Firestone. Aug 64, 28p
Task 1G0 24401A112 04
USAEL TR2417

Unclassified report

Descriptors: (*Metal films, Magnetic properties), (*Nickel alloys, Magnetic properties), (*Thin films (Storage devices), Nickel alloys), Iron alloys, Cobalt alloys, Electrodeposition, Hysteresis, Electrolytes, Gold, Chromium, Electronics, Solid state physics.

The magnetic properties of 2000-4000-angstrom-thick nickel-iron-cobalt films for potential use in computer memories, the preparation methods for these films, and their evaluation are discussed. A variety of nickel-iron-cobalt alloy compositions were prepared to determine the particular alloy or group of alloys that would offer improvement over a straight nickel-iron alloy with regard to magnetic characteristics such as lower coercivity, lower anisotropy, greater transverse loop linearity, and increased flux level. Optimum magnetic properties were achieved with a 74.1% nickel, 23.2% iron, 2.7% cobalt alloy film. This plated composition offers very desirable properties for application in computer memory arrays. (Author)

AD-609 859 Div. 17, 25
OTS Prices: HC $2.00/MF $0.50

Pennsylvania State Univ., University Park.

FIELD ION MICROSCOPY OF IRON WHISKERS.
Final rept.,
by Erwin M. Muller and Osamu Nishikawa.
Nov 64, 26p
Contract AF33 657 11242, Proj. 7353, Task 735304
ML TR64 346

Unclassified report

Descriptors: (*Iron, Single crystals), (*Single crystals, Iron), (*Electron microscopy, Field emission), (*Field emission, Electron microscopy), Neon, Helium, Ionization, Polarization, Crystal lattice defects, Evaporation, Tungsten, Crystal structure, Crystal growth, Impurities, Fiber metallurgy, Microstructure.

Further investigation of the imaging properties of neon in the field ion microscope revealed that the large difference between the neon and helium images of iron whiskers is due to the efficient energy transfer in the collision of neon atoms having polarization energy with the surface metal atoms. Whiskers which had been grown under various conditions at Materials Central were observed by the field ion microscope. It was found that the whiskers grown in the ultra-pure system had a low density of lattice defects and impurities. Some whiskers were observed with the help of an image intensifier. (Author)

AD-609 870 Div. 17
OTS Prices: HC $3.00/MF $1.00

Naval Research Lab., Washington, D. C.
DIFFUSION IN COLUMBIUM RICH COLUMBIUM-TITANIUM ALLOYS WITH CONSIDERATION OF THE POSSIBILITY THAT THE DIFFUSION COEFFICIENT IS TIME DEPENDENT.
Final rept.,
by Theodore C. Reuther, Jr. 14 Dec 64, 175p
Proj. RR007 01 46 5407
NRL 6221

Unclassified report

Descriptors: (*Niobium alloys, Diffusion), (*Titanium alloys, Diffusion), (*Diffusion, Niobium alloys), High-temperature research, Porosity, Transport properties, Differential equations, Time, Temperature, Heat of activation, Electron microscopy.

Interdiffusion has been studied in Cb vs. Cb 8.5 atom percent Ti and Cb vs. Cb 35 a/o Ti couples at temperatures of 1300 to 2000C and for times of 0.1 to 1000 hours. The electron microprobe has been used to obtain the penetration curves. Marker displacement toward and the development of porosity within the alloy at 1800 and 2000C demonstrate that a vacancy mechanism is operative in this b.c.c. alloy system. Porosity was also observed at 1500C. At 1500C for anneal times extending from 10 to 1000 hours for the more dilute alloy and from 10 to 120 hours for the 35 a/o Ti alloy, the interdiffusion coefficient D computed by the Boltzmann-Matano analysis is determined to be independent of time. The Arrhenius plot for results extrapolated to 100 a/o Cb is a straight line and yields an activation energy of 110 k cal/g-atom. However, as composition is increased to 30 a/o Ti, an increase in the concentration dependence of D is observed with decreasing temperature. This is manifest by curvature of the log D vs. 1/T plots with increasing titanium content. (Author)

18. Military Sciences and Operations

AD-609 477 . Div. 18, 13
OTS Prices: HC $1.00/MF $0.50

Mitre Corp., Bedford, Mass.
SYSTEM INSTALLATION AND TESTING,
by F. W. Hopkins. Dec 64, 22p Mitre-SR-123
Contract AF19 628 2390, Proj. 505
ESD TDR64 167

Unclassified report

Descriptors: (*Defense systems, Installation), (*Systems engineering, Air Force), (*Air force equipment, Test methods), Test equipment, Military requirements, Test facilities, Operations research.

The type of testing discussed in this report is that which takes place for every field installation to ensure that implementation of system components is accomplished properly and that optimum system performance is obtained. Implementation testing is defined, it is contrasted with other types of testing, its motivation is discussed, and its planning requirements are outlined. This report reveals how designing an implementation testing program in advance is an effective way of ensuring and accomplishing the successful implementation of the system in the field, at each location where its components are installed. (Author)

AD-609 480 Div. 18, 23, 28, 30
OTS Prices: HC $2.00/MF $0.50

American Institutes for Research, Pittsburgh, Pa.
Inst. for Performance Technology.
OCCUPANCY EXERCISE RESEARCH GUIDE: AN INTRODUCTION TO THE RESEARCH USE OF THE SHELTER EXERCISE FOR TRAINING.
Oct 64, 29p
Contract OCD OS63 97, Task 1517A

Unclassified report

Descriptors: (*Civil defense systems, Training), (*Shelters, Management engineering), (*Training, Scientific research), Confined environments, Students, Management planning, Research program administration, Operations research, Performance tests, Adjustment (Psychology), Human engineering, Survival, Civil defense personnel, Attitudes, Group dynamics.

An occupancy exercise may be defined as a planned portion of a civil defense training course in which students are brought together for an extended period of time to experience some of the conditions of shelter living. The purpose of the document is to present guidelines for obtaining research data from occupancy training exercises. It is intended for an audience of persons who are knowledgeable about shelter management but who have had little or no formal training in behavioral science research.

AD-609 483 Div. 18, 32

Special Operations Research Office, American Univ., Washington, D. C.
U. S. ARMY AREA HANDBOOK FOR BRAZIL,
by Bela C. Maday, Gabriel DeCicco, Susan E. Gilmour, Shirley J. Lehmann, and Luz E. Martorell.
Jul 64, 725p
DA PAM550 20

Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $3.50, as D-101.22:550-20.

Descriptors: (*Brazil, Social sciences), (*Social sciences, Brazil), (*Military publications, Handbooks), Army, Military intelligence, South America, Government (Foreign), Political science, Sociology, Economics, Armed forces (Foreign), Reviews.

This handbook seeks to supply a comprehensive survey of Brazilian society. The authors drew heavily on both English and Portuguese sources and were aided by a large number of consultants, who, in the absence of field study, supplied data not otherwise available. Contents include (1) social background: geography and population, historical setting, ethnic groups and languages, social structure, family, health and welfare, education, artistic and intellectual expression, religion, social values; (2) political background: the constitutional system, structure of government, political dynamics, public information, foreign relations, attitudes and reactions of the people; (3) economic background: agriculture, industry, labor force, labor relations and organization, domestic trade, foreign economic relations, public finance, banking and currency; and (4) national security: public order and safety, subversive potential, the armed forces.

AD-609 520 Div. 18, 26
OTS Prices: HC $3.00/MF $0.75

Army Chemical-Biological-Radiological Engineering Group, Army Chemical Center, Md.
VALUE ANALYSIS (VALUE ENGINEERING). A TECHNIQUE FOR OBTAINING MORE VALUE FOR THE DEFENSE DOLLAR.
Revised ed.,
by Harry O. Huss. Mar 63, 100p ENGS-SR-1

Unclassified report

Rev. of rept. dated Dec 61.

Descriptors: (*Department of Defense, Costs), (*Management engineering, Armed Forces, (United States)), (*Armed forces procurement, Management engineering), Armed forces budgets, Army budgets, Army procurement, Reduction, Economics, Chemical warfare, Biological warfare, Radiological warfare, Manufacturing methods.

Value analysis includes actions that identify and eliminate all unnecessary costs in design, development, and procurement of Army materiel without sacrificing essential quality or performance. Contents: Value analysis considerations; Value analysis fundamentals; Value analysis job plan; Value analysis techniques; Contracting for value analysis; Manufacturing processes; Value engineering worksheets; Examples of value analysis cost reductions of chemical-biological-radiological materiel and Bibliography on value analysis and value engineering.

AD-609 585 Div. 18, 12
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
WHY THE USA IS STRAINING TO GET INTO OUTER SPACE,
by N. A. Alexandrov. 26 Feb 59, 9p T-112
TT 59 10984

Unclassified report

Trans. from Sovetskii Flot (USSR) 1958, 25 Dec.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Military satellites, United States), Reconnaissance satellites, Military intelligence, Space environment conditions, Propaganda, USSR.

The use of outer space, 'sky spies', 'reconnaissance satellites', etc. by the United States is deplored by the Soviet Union.

AD-609 644 Div. 18
OTS Prices: HC $1.00/MF $0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
REFLECTIONS ON THE ROLE OF THE COMMANDER,
by S. S. Biryuzov. 22 May 64, 8p
ATD U64 45; TT 65 60556

Unclassified report

Razmyshleniya o Komandire, trans. from Krasnaya Zvezda (USSR) 1964, 28 Apr, p. 2, cols. 1-6.

Descriptors: (*Armed Forces, USSR), (*USSR, Officer personnel), Military personnel, Military training, Military tactics.

The pages of the newspaper 'Red Star' have carried a discussion of an article by Lt. Col. L. Goncharov entitled 'The Commander and Time.' The responses of readers to this article, received by the editorial staff, is the best proof that the questions discussed by the author are of great concern to our commanders. I readily accepted the suggestion of the editors that I express my views. 'The Commander and Time...' The thoughts of the majority of the officers participating in this discussion are mainly focused on the fact that a commander must constantly keep his hand on the pulse of our times, which have seen the turbulent development of the Armed Forces of the USSR.

AD-609 711 Div. 18, 24, 30
OTS Prices: HC $4.00/MF $1.00

Budd Co., McLean, Va. Information Sciences Center.
STUDY OF PICTORIAL DATA ANALYSIS CONCEPTS AND TECHNIQUES.
Final rept. for 1 Apr 63-30 Apr 64.
31 May 64, 127p
Contract AF49 638 1231
AFOSR 64 2529

Unclassified report

Also includes: Systems for Generating One-Dimensional Patterns, by Azriel Rosenfeld and Albert Goldstein, pub. in Applied Optics, vol 3, no. 4, Apr 64.

Descriptors: (*Photographic analysis, Electronic equipment), (*Photointerpretation, Pattern recognition), (*Pattern recognition, Photointerpretation), Photointerpretability, Design, Photographic recording systems, Computers, Input-output devices, Automatic, Optical equipment, Photographic intelligence.

The problem of developing rules for subdividing complex pictures into 'uniform' regions is discussed. Experiments are described in which rules of this type applicable to 'one-dimensional' pictures are derived from an analysis of observers' subdivision preferences. (Author)

AD-609 734 Div. 18, 13, 20
OTS Prices: HC $3.00/MF $0.75

Naval Radiological Defense Lab., San Francisco, Calif.
THE DESIGN AND PERFORMANCE OF A FALLOUT-TESTED MANNED SHELTER STATION AND ITS SUITABILITY AS A SINGLE-FAMILY SHELTER,
by J. D. Sartor, P. D. LaRiviere, H. Lee, and J. I. Pond. 23 Apr 63, 54p
USNRDL TR647

Unclassified report

Descriptors: (*Shelters, Radioactive fallout), (*Civil defense systems, Shelters), Design, Costs, Performance (Engineering), Nuclear explosion damage, Environmental tests, Specifications, Explosion effects, Gamma rays, Attenuation, Underground structures, Steel.

The design details, cost analysis and performance characteristics are presented for small, partially-underground fallout shelters utilized as manned stations during a nuclear weapon effects test. Four men occupied each shelter and operated radiation measurement and fallout collection instruments. Two types of shelters were designed to withstand predicted overpressures: Type I for a 1-psi overpressure and Type II for a 5-psi overpressure. The basic structure consisted of an 8-ft diameter, 10-ft long, 12-gage corrugated steel, multi-plate pipe. A steel entranceway incorporating two right-angle turns provided access to the basic structure. Depending upon the amount of soil backfill, fallout gamma radiation protection factors up to 470,000 were obtained. The overall performance of the shelters under the conditions experienced was excellent. It is suggested that shelters of this type have application not only for use as manned stations in nuclear weapon testing but can be adapted as well for use in residential areas as single-family fallout shelters. (Author)

AD-609 763 Div. 18, 30
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Washington, D. C.
SIMULATION AND ANALYSIS OF 473L SYSTEM.
VOLUME I. SIMULATION OF 473L SYSTEM OVER A RANGE OF OPERATING CONDITIONS.
Final rept., vol. 1,
by Stanley B. Rosen, John P. McCabe, Essie S. Nevans, Richard Walden, and John Falvey. Dec 64, 39p
Contract AF19 628 3843, Proj. 2801, Task 280101
ESD TDR64 656 VI

Unclassified report

See also: AD-609 764, AD-609 765.

Descriptors: (*Command and control systems, Air Force), (*Data processing systems, Command and control systems), Computers, Data storage systems, Models (Simulations), Systems engineering, Programming (Computers), Simulation, Equations, Performance (Engineering).

The overall 473L Command and Control System was modeled and simulated in order to predict performance over a range of operating conditions. Disc access time was the variable of primary interest, and performance was measured in terms of response time, computer and disc utilization, and total storage requirements. An analytic solution was derived which substantiated the simulation results. Response time and storage capacity were found to be adequate, but it is recommended that the central processor assume more of the processing load and that the complex priority interrupt scheme be simplified. (Author)

AD-609 764 Div. 18, 30
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Washington, D. C.

SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME II. SIMCOM AND SIMSCRIPT SIUMLATION TECHNIQUES; A COMPARISON.
Final rept., vol. 2,
by Stanley B. Rosen, John P. McCabe, Essie S. Nevans, Richard Walden, and John Falvey. Dec 64, 17p
Contract AF19 628 3843, Proj. 2801, Task 280101
ESD TDR 64 656 V2

Unclassified report

See also: AD-609 763, AD-609 765.

Descriptors: (*Command and control systems, Air Force), (*Data processing systems, Command and control systems), Computers, Data storage systems, Models (Simulations), Systems engineering, Programming (Computers), Programming languages, Simulation, Performance (Engineering), Costs.

A comparison of the efficiency of the SIMCOM and SIMSCRIPT simulation techniques was made based on their application to a common simulation model. The results demonstrated that SIMCOM is more efficient in the initial setup stage and that SIMSCRIPT is more efficient in the production stage. Curves of cost versus the number of production runs were plotted showing the number of production runs at which the two techniques require the same expenditure of funds. (Author)

AD-609 765 Div. 18, 30
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Washington, D. C.
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME III. ANALYSIS OF SERIAL AND PARALLEL FILE STRUCTURES.
Final rept., vol. 3,
by Stanley B. Rosen, John P. McCabe, Essie S. Nevans, Richard Walden, and John Falvey. Dec 64, 43p
Contract AF19 628 3843, Proj. 2801, Task 280101
ESD TDR64 656 V3

Unclassified report

See also: AD-609 763, AD-609 764.

Descriptors: (*Command and control systems, Air Force), (*Data processing systems, Command and control systems), Computers, Data storage systems, Models (Simulations), Systems engineering, Magnetic tape, Information retrieval, Simulation, Performance (Engineering), Equations.

This study was undertaken to determine if the introduction of data redundancy can reduce search time in storage and retrieval applications that use magnetic tape. Serial and parallel file structures and directories on magnetic tape and disc memories were examined. It was concluded that search time can be improved through utilization of data redundancy and the random-access features of disc memory. (Author)

AD-609 791 Div. 18, 26
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ASSESSING THE IMPACT OF WEAPON SYSTEM MODIFICATIONS BY FIELD STUDY: A FEASIBILITY DEMONSTRATION.
Memo. rept.,
by Anders Sweetland. Nov 64, 38pk RM-4323-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Weapon systems, Systems engineering), (*Maintenance, Management engineering), Data, Aircraft, Aircraft engines, Fire control systems, Analysis, Feasibility studies, Air force personnel, Effectiveness, Corrections, Decision making, Costs, Monitors, Reliability, Performance (Engineering), Modification kits, Scheduling.

Studies have been made on ways to increase the productivity of the Air Force maintenance management system. These studies have suggested adding clock-hours and status data to the current data system (AFM 66-1, Maintenance Management), and have proposed the use of computers in maintenance management and analysis. These additions have made practicable analyses of maintenance data that were heretofore deemed impossible. The memorandum continues the previous line of inquiry. It demonstrates how these adjuncts to the present system may be used to assess the cost and effectiveness of engineering modifications. The procedures are described using two examples: an engine modification of T-38A aircraft, and a fire-control system modification of F-101B aircraft. The two procedures are then contrasted to show how the combination of methods can provide the most meaningful set of data. It is shown how the method of recording and analyzing may also be used to provide a history of the installation-checkout process during this vital period. (Author)

AD-609 793 Div. 18, 26
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PRODUCT IMPROVEMENT CANDIDATE SELECTION AND MANAGEMENT INFORMATION.
Memo. rept.,
by K. L. Deavers. Nov 64, 28p RM-4324-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Management engineering, Weapon systems), (*Weapon systems, Systems engineering), Management engineering, Decision making, Decision theory, Costs, Maintainability, Maintenance, Selection, Quality control, Standards, Probability, Reliability, Corrections, Air force personnel, Effectiveness, Performance (Engineering), Flight.

The memorandum discusses the weapon system output process, and the way in which product improvements contribute to increased system output. It investigates the use of AFM 66-1 data for product improvement decision-making and devotes particular attention to the problem of selecting product improvement candidates. The product improvement options available fall into two categories: (1) changes in management policies; (2) changes in weapon system hardware parameters. Of primary concern in the study are Air Force Class IV product improvements, i.e., those affecting safety of flight or mission essential systems. A new approach to product improvement, based on the use of a 'priority menu,' is suggested. This menu provides a listing of the candidates for product improvement ordered by system support costs. The data needed to use the menu for product improvement are given detailed consideration. Suggestions are made for manipulating the current AFM 66-1 data to obtain an approximation of system downtime, a key element in developing the menu. There is also a discussion of the application of 'control limits' procedures to product improvement candidate selection. (Author)

AD-609 883 Div. 18, 23, 26
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
INSTRUCTOR'S NOTES FOR CASE PROBLEMS IN THE CONTRACTUAL ASPECTS OF VALUE ENGINEERING.

Training guide supplement MB.
Apr 64, 15p
AD 604 662 suppl.
Unclassified report

Supplement MB to 'The Management of Value Engineering Programs in Defense Contracts', AD-604 662.
See also AD-609 884.

Descriptors: (*Armed forces procurement, Management engineering), (*Management engineering, Costs), (*Department of Defense, Armed forces procurement), United States Government, Defense systems, Government employees, Industries, Instruction manuals, Systems engineering, Training devices.

This Supplement contains answers, notes, and charts for the nine case problems on the contractual aspects of value engineering, which are presented in Chapter 5 of the DoD Training Guide for the Management of Value Engineering Programs in Defense Contracts. These notes are based upon interpretation of Revision 3, dated 15 November 1963, of Part 17 of Section 1 of the Armed Services Procurement Regulation. (Author)

AD-609 884 Div. 18, 23, 26
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
TRAINING AIDS: DESCRIPTION AND FORMAT.
Training guide suppl. MP.
Apr 64, 19p
AD 604 662, suppl; AD 604 663, suppl.
Unclassified report

Suppl. to 'The Management of Value Engineering Programs in Defense Contracts' and 'Principles and Applications of Value Engineering.'
See also AD-609 883.

Descriptors: (*Armed forces procurement, Management engineering), (*Management engineering, Costs), (*Department of Defense, Armed forces procurement), (*Training devices, Department of Defense), United States Government, Government employees, Defense systems, Instruction manuals.

The training aids described in this Supplement are recommended for use in formal training based upon the DoD Training Guides, Principles and Application of Value Engineering and the Management of Value Engineering Programs in Defense Contracts. The Training Guides were prepared to be generally applicable to all readers. Some of the training aids are applicable to all elements of the DoD; others need to be related to the trainee's assignment within the DoD. A positive correlation should exist between the aids that are illustrative case examples and the types of equipment procurement situation that each group of trainees usually face in their daily work.

19. Navigation

AD-609 497 Div. 19, 6
OTS Prices: HC $3.00/MF $0.75

Airborne Instruments Lab., Inc., Deer Park, N. Y.
RADAR DATA MEASURING SYSTEM.
Final rept.
Sep 64, 80p
Contract FA WA4206, Proj. 107 9D
FAA RD64 126
Unclassified report

Descriptors: (*Air traffic control systems, Radar equipment), (*Radar reflections, Measurement), (*Digital recording systems, Radar reflections), Search radar, Radar equipment, Radar signals, Recording systems, Radar targets, Aircraft, Signal-to-noise ratio, Track-while-scan, Radar tracking, Digital computers, Data.

This report describes the design, development, and field tests of the Radar Data Measuring System. This system operates in conjunction with search radars, and continuously makes and records signal energy measurements while automatically tracking a selected aircraft. The system contains three identical measuring channels that measure the ratio of total integrated signal energy to average system noise level; it also contains a fourth signal measuring channel that makes pulse-to-pulse peak amplitude measurements. The four channels operate in parallel on a single selected aircraft. It is concluded that the Radar Data Measuring System fulfils its intended use, and that the signal measurements are an accurate measure of the aircraft signal energy returns. The system has been tested on three different radars and has performed quite satisfactorily with all three.

AD-609 810 Div. 19, 6, 8
OTS Prices: HC $6.00/MF $1.25

Montek Div., Model Engineering and Mfg. Corp., Salt Lake City, Utah.
SOLID STATE TACAN.
Final rept.,
by Thiel J. Gomm, R. Max Steadman, Harold C. Renner, and K. Charles Eder. Sep 64, 233p Montek-63-234
Contract AF19 628 3263, Proj. 482L
ESD TDR64 548 Unclassified report

Descriptors: (*Radio navigation, Air Force), (*Solid state physics, Radio navigation), (*Navigation, Solid state physics), Airborne, Transmitter-receivers, Radio beacons, Detectors, Transponders, Pulse generators, Modules (Electronic), Circuits.

The object was to perform the design, development, and fabrication of circuitry required for integrating the major solid-state components and sub-systems provided by vendors into an experimental solid-state TACAN transponder beacon and monitor, and to evaluate these components as sub-systems and as a complete TACAN transponder system with monitor. The four-man Montek team accomplished the following: (a) Resolved the problems found in the major solid-state components (sub-systems); (b) Solved the interface problems between the solid-state components; (c) Integrated the major components into a solid-state TACAN ground transponder beacon with monitor; (d) Maintained and utilized an airborne interrogator-responder (AN/ARN-21) to assist in the testing of the solid-state transponder breadboards; and (e) Performed tests to compare the parameters of the solid-state transponder with the AN/URN-3 test bed (which the Montek team set-up and maintained while at Fort Dawes, Massachusetts). Due to the basic deficiencies in the solid-state major components (breadboards), it is recommended that this solid-state test bed remain with the experimental facility and be used for experimental purposes only.

20. Nuclear Physics and Nuclear Chemistry

AD-609 541 Div. 20, 25
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
RARE EARTH IONS IN CRYSTALLINE FIELDS.
Final technical rept. for 1 Sep 58-31 Aug 61,
by Robert A. Satten. 30 Nov 64, 16p
Contract DA04 495ORD1375; Grant DA ARO D31 124G75,
Proj. 2099
AROD 2099 22

Unclassified report

Descriptors: (*Rare earths, Nuclear physics), (*Ions, Rare earths)), (*Crystal lattices, Ions), Uranium, Chlorides, Atomic structure, Praseodymium, Neodynauim, Thulium, Cerium, Atomic orbitals, Atomic energy levels, Electrons, Brillouin zones, Theory, Integrals, Matrix algebra, Absorption, Spectroscopy, Electron transitions, Selection rules.

The research described in this report has as its general purpose the basic experimental and theoretical study of rare earth ions (lanthanide and actinide) in crystalline fields.

AD-609 565 Div. 20, 17
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
YANKEE REACTOR PRESSURE VESSEL SURVEILLANCE: EVALUATION OF SPECIMENS EXPOSED DURING THE SECOND CORE,
by C. Z. Serpan, Jr., H. E. Watson, J. R. Hawthorne and L. E. Steele. 24 Nov 64, 19p
Contract AT49 5 2110, Projs. PR007 01 46 5409, SR007 01 01, Task 0858
NRL 6179

Unclassified report

Descriptors: (*Radiation damage, Steel), (*Steel, Radiation damage), (*Pressure vessels, Steel), Radiation measurement systems, Radiation monitors, Nuclear reactors, Test methods, Fast neutrons, Transition temperature, Ductility, Physical properties, Heat treatment, Nuclear power plants.

Pressure vessel surveillance specimens from four capsules in accelerated irradiation positions of the Yankee Atomic Power Reactor have been tested. In spite of the fact that the four capsules were located in physically identical positions about the fuel core, they were subject to widely different neutron exposures (>1 Mev). The Charpy-V transition temperature increase of the Yankee pressure vessel steel, which was irradiated together with a reference steel of the same nominal composition in the same capsules, was somewhat larger than the increase of the reference steel. The data from the reference steel followed closely the trend line of transition temperature increase versus total neutron exposure previously established by NRL for 540F irradiations, but that for the Yankee vessel steel was displaced almost 100F higher than the reference steel. Postirradiation annealing was beneficial for the three heat treatment conditions studied, and, in one case, essentially complete recovery of initial properties was observed. The study demonstrated the usefulness of accurate dosimetry data for each surveillance specimen and the importance of measurements of the neutron dosage to which the monitored reactor component is exposed. (Author)

AD-609 587 Div. 20
OTS Prices: HC $2.00/MF $0.50

High Energy Physics Lab., Stanford Univ., Calif.
LINEAR ELECTRON ACCELERATOR PROJECT.
Status rept. for 1 Aug-31 Oct 64.
Nov 64, 42p HEPL-353
Contract Nonr22567

Unclassified report

Descriptors: (*Electron accelerators, Nuclear scattering), (*Electrons, Scattering), Elastic scattering, Inelastic scattering, Linear accelerators, Magnets, Spectrum analyzers, Klystrons, Life expectancy, Maintenance, Shielding, Modulators, Magnetic moments.

The Mark III accelerator operated with good reliability in spite of increasing frequency of the occurrence of water leaks in the rf loads. The loads are being replaced with a leak proof variety on a schedule which interferes very little with Mark III operation for research. Research with Mark II continued as usual. The Mark III electron scattering program has recently installed auxiliary magnets so that the 72 inch spectrometer can measure electrons scattered at 180 degrees. With this apparatus the elastic scattering from the magnetic octupole moment of Be9 and B11 has been studied as a function of momentum transfer. These experiments give for the first time a method of studying in detail the space distributions of the static magnetic moments of light nuclei. The colliding beams experiment is still experiencing difficulties from beam loss or beam cross section increase caused by beam-beam interactions. A visit by two Russian physicists from Novosibirsk revealed that their e(-) - e(-) colliding beams experiment is subject to similar difficulties.

AD-609 603 Div. 20, 17
OTS Prices: HC $1.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
DETERMINATION OF X-RAY SCATTERING FACTORS WITH LIQUID SPECIMENS.
Technical rept. no. 5,
by Roy Kaplow, S. L. Strong, and B. L. Averbach.
3 Nov 64, 12p
Contract Nonr184148, Proj. DSR7954

Unclassified report

Descriptors: (*X rays, Scattering), (*Nuclear scattering, Liquid metals), (*Liquid metals, Nuclear scattering), Intensity, Lead, Mercury, Tin, Compton scattering, Distribution Theory.

An analysis is described for obtaining x-ray scattering factors from intensity measurements on liquid specimens. Experimental results for the shape of the scattering factor curves for lead, mercury and tin are compared to Thomas-Fermi-Dirac, Hartree-Fock-Slater, Hartree-Fock, Hartree (self-consistent field) and relativistic calculations. (Author)

AD-609 645 Div. 20, 2
OTS Prices: HC $1.00/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
MIGRATION OF FUSED FALLOUT SIMULANT INTO SOILS,
by Alfred E. Hanna. 16 Jan 64, 16p
Proj. Y F011 05 01 202
NCEL N563

Unclassified report

Descriptors: (*Radioactive fallout, Soil mechanics), (*Soil mechanics, Radioactive fallout), Radiological

contamination, Simulation, Soils, Transport properties, Tracer studies, Barium, Sodium compounds, Silicates, Freezing, Melting, Test facilities, Cold weather tests, Photographs, Experimental data, Decontamination, Health physics.

The U. S. Naval Civil Engineering Laboratory conducted a study of the migration of fused fallout simulant into alternately frozen and thawed soils. Four different soils or soil mixtures were used; Monterey sand treated with Barium-140 and sodium silicate was the fallout simulant. Radiation levels were measured after each of twelve thaw-freeze cycles. It was concluded that the fused fallout simulant did not migrate into the soils. Further work is recommended using actual fallout debris. (Author)

AD-609 678 Div. 20
OTS Prices: HC $0.50/MF $0.50

Army Materials Research Agency, Watertown, Mass.
VIBRATIONAL LEVELS IN LIQUID BROMINE BY NEUTRON INELASTIC SCATTERING,
by J. J. Antal and M. Antonini. Oct 64, 22p
Proj. 1A010501B010
AMRA TR64 32

Unclassified report

Descriptors: (*Bromine, Atomic energy levels), (*Neutron scattering, Bromine), (*Chemical bonds, Vibration), Inelastic scattering, Diatomic molecules, Halogens, Liquids, Beryllium, Quartz, Containers, Nuclear spectroscopy, Infrared spectroscopy, Neutron diffraction analysis, Corrections, Monochromatic light, Monitors, Signal-to-noise ratio, Graphite, Test methods, Equations.

The first and second vibrational levels of the Br-Br molecule have been measured directly for the first time in the liquid state. The beryllium filter technique of neutron inelastic scattering was employed to excite the vibrational levels and measure their energy. Low intensities of scattered neutrons were encountered because of the large mass of the bromine atom, and a special correction technique had to be devised to remove the effect of the quartz container necessary to hold this reactive liquid. The bromine molecule appears to retain its individuality in the liquid state as evidenced by the close agreement of the vibrational energy values found in this experiment (0.0401 ev and 0.0836 ev) with those found by others from infrared studies on the gaseous state. (Author)

AD-609 874 Div. 20, 2
OTS Prices: HC $4.00/MF $1.00

Beers (Roland F.) Inc., Alexandria, Va.
ANALYSIS OF SHOAL DATA ON GROUND MOTION AND CONTAINMENT SAFETY PROGRAM.
Final rept.
4 Dec 64, 118p
Contract AT29 2 1163
ARPA VUF1013

Unclassified report

Rept. on Vela Uniform Proj. Shoal, Fallon, Nevada, 26 Oct 63.

Descriptors: (*Nuclear explosions, Underground explosions), (*Seismic waves, Nuclear explosions), (*Shielding, Nuclear explosions), Nevada, Safety, Soil mechanics, Vulnerability, Motion, Spallation, Instrumentation, Measurement.

Predictions and evaluations of ground motion and containment were made for the 12.5 kt Shoal event. A comprehensive ground motion instrumentation program was designed. Peak motions on alluvium were greater than on hardrock by a factor of 2.1 for acceleration, 3.7 for displacement and 3.4 for velocity. The prediction equations for acceleration and displacement were found to represent reasonable upper limits of motion. The objective of the containment evaluation was to assure that appropriate measures had been taken to preclude unacceptable venting of radioactive isotopes to the atmosphere. It was concluded that Shoal would be contained to the same degree as Hardhat and that the stemming plan was adequate. The prediction of containment was substantiated by test results. Limited post-shot exploration allows the following comparisons: cavity radius - 24.7 meters predicted, 25.6 ± 0.6 meters observed; chimney height - 110 meters predicted, 108 meters observed; depth of spalling - 122 meters predicted, 120+ meters indicated; radius of spalling - <914 meters predicted, 794 meters observed.

21. Nuclear Propulsion

No Entries

22. Ordnance

AD-609 449 Div. 22, 17
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
INITIATION OF EXPLOSIVES BY EXPLODING WIRES. V. EFFECT OF WIRE MATERIAL ON THE INITIATION OF PETN BY EXPLODING WIRES,
by Howard S. Leopold. 26 Oct 64, 49p
Task RUME4E000 212 1F008 11
NOL TR64 146

Unclassified report

Descriptors: (*Explosives initiators, Exploding wires), (*Exploding wires, Effectiveness), (*PETN, Ignition), Explosive materials, Firing circuits, Tests, Aluminum, Gold, Platinum, Tungsten, Ordnance.

Aluminum, gold, platinum, and tungsten wires were investigated to determine the effect of the wire material on the initiation of PETN by exploding wires. The wires were exploded by a one microfarad capacitor charged to 2000 volts. The results indicate that favorable wire materials are those into which energy is deposited at a rapid rate. They also have low boiling points and low heats of vaporization. Heat of oxidation of the wire material plays only a minor role. Different wire materials have different optimum lengths for effecting detonation. (Author)

AD-609 641 Div. 22, 17
OTS Prices: HC $3.00/MF $0.75

High Velocity Lab., Univ. of Utah, Salt Lake City.
CRATERING PRODUCED IN METALS BY HIGH-VELOCITY IMPACT,
by D. K. Johnson, E. T. Cannon, E. P. Palmer, and R. W. Grow. 31 Jul 59, 74p UU-4
Contract AF04 647 176
AFBMD TR59 21

Unclassified report

Descriptors: (*Metals, Cratering), (*Cratering, Hypervelocity projectiles), (*Hypervelocity projectiles, Cratering), Steel, Copper, Lead, Aluminum, Magnesium, Zinc, Silver, Penetration, Spheres, Projectiles, Momentum, Energy, Volume, Shear stresses, Targets.

Steel spheres having a diameter of 3/16 inch (0.476 cm) were accelerated with a 220 or 243 caliber smooth-bore gun up to velocities of 2.5 kilometers per second. The area, volume, and depth of the resulting craters were measured and plotted as a function of either the initial impact energy or momentum of the projectile. The crater volume was a linear function of the projectile energy. A relationship existed between the volume per unit energy and the static shear and compressive yield strengths. A plot of crater area versus projectile momentum had two linear segments. A region of negative slope for penetration versus projectile momentum was found for aluminum, lead, and magnesium targets. The other targets did not have this region. Partridge, VanFleet, and Whited (PB-128 423; 'Crater formation in metallic targets'. Journal of Applied Physics, 29:1332-1336 (1958)) presented data for many of the same targets impacted with spheres of the same material as the target. Comparisons were made between their data and the data obtained using steel spheres for the projectile. Correlation between the data was excellent in most cases.

AD-609 672 Div. 22, 14, 17
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
RESEARCH AND DEVELOPMENT OF MATERIALS FOR GUNS AT WATERTOWN ARSENAL LABORATORIES. IMPACT PROPERTIES OF STEEL MICROSTRUCTURES.
Monograph series,
by Robert R. Lutz. 28 May 59, 21p
WAL MS2

Unclassified report

Descriptors: (*Gun components, Materials), Gun barrels, Titanium alloys, Aluminum alloys, Steel, Plastics, Reinforcing materials, Tensile properties, Microstructure, Wear resistance, Corrosion inhibition, Failure (Mechanics), Analog computers.

A summary is given of recent metallurgical studies of materials for guns which have been directed toward developing high-strength materials to minimize the weight of artillery weapons. Evaluations of many promising, high-strength candidate materials including ultra high-strength steels, titanium alloys, aluminum alloys, and reinforced plastics are presented.

AD-609 690 Div. 22
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
BALLISTIC CONCEPTS EMPLOYED IN TESTING LIGHTWEIGHT ARMOR.
Monograph series,
by Francis S. Mascianica. 5 Oct 59, 13p
WAL MS12

Unclassified report

Descriptors: (*Armor, Test methods), Helmets, Fragmentation ammunition, Test facilities, Penetration, Deformation, Terminal ballistics, Armor plate.

The ballistic testing techniques which are described have been developed by various research establishments with a view toward improving ballistic testing techniques, especially with regard to determining ballistic limits with minimum number of rounds and developing a simple and reproducible test. Much thought has been given to developing and standardizing a ballistic test for use in rating, comparing, and testing fragment-resistant armor. The ballistic test that is currently in use by the Ordnance Corps for specification acceptance of lightweight armor materials is the one employing fragment-simulating projectiles. It is considered to be the simplest, most reproducible, and most meaningful of any test developed to date. (Author)

AD-609 737 Div. 22, 12
OTS Prices: HC $1.00/MF $0.50

Fairchild Space and Defense Systems, Syosset, N. Y.
DESIGN AND DEVELOPMENT OF MECHANICAL MODULAR PROGRAMMER.
Monthly progress rept. no. 2, 1 Aug-1 Oct 64,
by I. McRae. 1 Oct 64, 23p
Contract DA30 069AMC170A

Unclassified report

See also AD-600 946.

Descriptors: (*Fuze functioning elements, Design), (*Arming devices, Design), Safety devices, Guided missile fuzes, Counting methods, Containers, Tests, Manufacturing methods, Time-delay fuzes.

Progress is described on the design and development of mechanical modular programmers for use in guided missile warheads. Components include an indicator module, rate module, and safe-arm module.

AD-609 865 Div. 22
OTS Prices: HC $2.00/MF $0.50

Florida Univ., Gainesville. Coll. of Engineering.
RESPONSE OF A THIN SHELL TO A SHOCK WAVE.
Rept. for 1 Oct-31 Dec 63,
by J. Siekmann. 30 Jan 64, 49p Unclassified report
Contract DA18 064AMC144A

Descriptors: (*Explosive materials, Detonation waves), (*Shock waves, Fluid dynamic properties), (*Structural shells, Explosive effects), Differential equations, Programming (Computers), Numerical analysis, Integration, Fracture (Mechanics), Loading (Mechanics), Stresses, Propagation, Fragmentation, Spheres, Energy.

Topics include: development of a blast wave, emanating from a finite source within a shell, immediately before its collision with the shell; fragmentation of a spherical shell containing an explosive; motion of products of an explosion behind spherical detonation waves in solid explosives; preliminary remarks on numerical integration; numerical solution for the special case of symmetrical blast waves.

AD-609 878 Div. 22, 30
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.

THE LCU 1446 MOBILE TEST FACILITY.
Nov 64, 27p
NOTS TP3452; NAVWEPS 8485
Unclassified report

Descriptors: (*Test facilities, Underwater ordnance), (*Underwater ordnance, System test vessels), (*Landing craft, System test vessels), (*System test vessels, Underwater ordnance), Mobile, Test equipment, Underwater, Guided missile launchers, Captive tests, Rocket motors, Ships, Weapon systems, Oceanology, Telemeter systems, Guided missile ranges, Safety.

Development of a mobile sea-test facility, the LCU 1446, and pertinent characteristics of its major components are detailed. Special features of the craft, the underwater launcher, the static firing pad, and the deep-water recovery system are described. Particulars include current assignments for generating data related to: firing an underwater missile from a fixed launcher, static firing of a rocket motor under water, and recovery of expended ordnance from deep water. Conjunctive assignments are diverse, ranging from oceanographic studies to communications and telemetry relay coupled with range support and safety surveillance. The discussion of typical operational concepts of the LCU 1446 serves as a basis for evaluating its potential for future research and developmental testing of underwater ordnance. (Author)

23. Personnel and Training

AD-609 485 Div. 23, 28, 30
OTS Prices: HC $3.00/MF $0.75

Utah Univ., Salt Lake City.
IDENTIFYING RESEARCH CHARACTERISTICS IN HIGH SCHOOL STUDENTS, A SECOND STUDY,
by Calvin W. Taylor, Elwin Nielsen, Gary M. Cooley, and Robert Ellison. Aug 64, 57p
Grant AF AFOSR11 63
AFOSR 64 2261

Unclassified report

Original document contains color other than black and white and is available in limited supply. After present stock is exhausted, it will be available in black-and-white only.

Descriptors: (*Military personnel, Selection), (*Students, Psychometrics), (*Intelligence tests, Scientific personnel), (*Aptitude tests, Scientific personnel), Air Force, Recruiting, Training, Research program administration, Performance tests, Air force personnel, Education, Tables.

An attempt was made to discover the best predictor of creative scientific talent in high school students. A new study was undertaken with a three-fold purpose: (1) to focus on improving the spread of criterion rating scores over those obtained in our first study of the research participation programs; (2) to obtain cross validities on the best predictors used in the previous summer's study; and (3) to provide ourselves an opportunity to try out a few new predictor instruments.

AD-609 540 Div. 23, 28, 30
OTS Prices: HC $2.00/MF $0.50

Training Research Lab., Univ. of Illinois, Urbana.
A MODEL AND CYBERNETIC SYSTEM FOR RESEARCH ON THE TEACHING-LEARNING PROCESS,
Technical rept. no. 4,
by Lawrence M. Stolurow. Sep 64, 45p
Contract Nonr398504, Proj. NR154 239

Unclassified report

Rept. on Research on Pre-Programed Self-Instruction and Self-Programed Individualized Education. Presented at a Symposium on Psychological Problems on Cybernetic Research held at Humboldt Univ., Berlin, E. Germany, Sep 64. This paper, in German, will be published in the proceedings of the Symposium.

Descriptors: (*Learning, Analysis), (*Cybernetics, Education), Personality, Psychometrics, Instructors, Teaching machines, Decision theory, Scientific research.

The paper first presents the basis elements of a learning theory that distinguishes among three interrelated processes, and then describes the way in which these processes determine the requirements of an adaptive teacher. The learning-teaching process is considered as a cybernetic man-machine system and one which is designed to take into account individual differences in learners. The SOCRATES design and the characteristics of idiomorphic programing are indicated. This part of the paper elucidates the conception and illustrates, in operational terms, the way in which different characteristics of learners are taken into account in idiomorphic programing which is implemented as a two-stage decision process. Some research is cited to indicate the basis for including certain features in the system design and other research. (Author)

AD-609 605 Div. 23, 28
OTS Prices: HC $3.00/MF $0.75

American Inst. for Research, Palo Alto, Calif.
STUDY OF TRAINING PERFORMANCE EVALUATION TECHNIQUES.
Technical rept.,
by David Angell, James W. Shearer, and David C. Berliner. 16 Oct 64, 82p
Contract N61339 1449
NAVTRADEVCEN 1449 1

Unclassified report

Descriptors: (*Training devices, Effectiveness), (*Training, Performance tests), Simulators, Simulation, Performance (Human), Behavior, Measurement, Recording systems, Automatic, Instructors, Systems engineering, Test equipment, Military training, Computers, Pilots, Data.

The report discusses performance evaluation in the training environment, specifically in training situations involving the use of simulators and other complex training equipment. The important variables involved in developing a system of performance evaluation are seen as (1) types of behaviors, (2) types of measures or mensural indices, and (3) types of instruments for recording performance. Factors relating to these variables are discussed, and some of their interrelationships are delineated. Matrices which facilitate the consideration of interrelationships among the three variables are presented. An illustrative application of an automatic training/evaluation system is given. (Author)

AD-609 668 Div. 23
OTS Prices: HC $1.00/MF $0.50

Naval School of Aviation Medicine, Pensacola, Fla.
AN INVESTIGATION OF UNPREDICTED DIFFERENCES IN ATTRITION RATES AMONG STUDENTS FROM DIFFERENT PROCUREMENT SOURCES.
Research rept. no. 40,
by Robert J. Wherry, Jr. and Charles W. Hutchins, Jr.
9 Oct 64, 17p
Proj. MR005 13 3003, Task 1

Unclassified report

Descriptors: (*Aviation personnel, Education), (Education, Aviation personnel), (*Naval personnel, Education), (*Naval training, Effectiveness), Aptitude tests, Psychometrics, Test methods, Selection, Officer personnel, Military personnel.

An attempt was made to determine if there were differences in attrition rates among aviation students from the various procurement sources over and above those differences that might be predicted from scores on routinely available prediction variables. The subjects consisted of 1346 non-officer and 726 officer flight students who were divided on the basis of their procurement sources. With the non-officer flight students the only significant differences in unpredicted attrition rates among students from various procurement sources were in type of attrition, not in over-all attrition rate. With the officer students there were significant residual differences among officers from different procurement sources in both over-all attrition rate and in type of attrition. It is suggested that differences in attitudes toward quitting among different types of students is the most fruitful in terms of future study of the causes of residual attrition differences. (Author)

AD-609 699 Div. 23, 30
OTS Prices: HC $1.00/MF $0.50

Coordinated Science Lab., Univ. of Illinois, Urbana.

A DESCRIPTIVE LIST OF PLATO LESSON PROGRAMS, 1960-1964,
by Elisabeth R. Lyman. Nov 64, 8p CSL-R-186
Contract DA28 043AMC00073E

Unclassified report

Partly supported by the Office of Naval Research, Washington, D. C. and the Air Force Office of Scientific Research, Washington, D. C.

Descriptors: (*Education, Programming (Computers)), (*Programming (Computers), Education), (*Teaching machines, Programming (Computers)), Digital computers, Computer logic, Training devices, Automation.

For the past three years, the Coordinated Science Laboratory has been developing an automatic teaching system called PLATO (Programmed Logic for Automatic Teaching Operation) in order to explore the possibilities of automation in individual instruction. In the course of development 43 lesson programs have been written for the system to illustrate or demonstrate the flexibility of the system for instruction. This report lists and briefly describes the nine sequences (24 lessons) which were written for the tutorial logic and the eleven sequences (17 lessons) written for the inquiry logic. The version of the PLATO system for which the lessons were written is specified in each instance. PLATO I and PLATO II lessons are no longer operable on the PLATO system because the PLATO I and PLATO II systems are now obsolete.

AD-609 725 Div. 23, 26
OTS Prices: HC $4.00/MF $1.00

Dunlap and Associates, Inc., Santa Monica, Calif.
A METHOD FOR DERIVING JOB STANDARDS FROM SYSTEM EFFECTIVENESS CRITERIA. VOLUME I. METHOD DEVELOPMENT,
Dec 64, 135p
Contract Nonr431400

Unclassified report

Descriptors: (*Naval personnel, Performance (Human)), (*Performance (Human), Standards), (*Mathematical models, Performance (Human)), Effectiveness, Naval training, Systems engineering, Management engineering, Personnel management, Maintenance, Probability, Equations, Test methods, Military psychology.

The cost and complexity of modern Naval systems and the increasing difficulty in achieving optimal use of Naval personnel and training resources establish the need for a method for determining objectively the level of personnel performance necessary to meet Naval system operational requirements. The purpose of this study was to develop such a method with a basic capability for: (1) deriving specific personnel performance standards with definable relations to ultimate system effectiveness requirements; and (2) determining the effect on system effectiveness of personnel performance levels that deviate from established performance standards. To assist in formulating an approach to method development, existing methods and techniques for relating personnel performance to system effectiveness were appraised for relevance to the present study and were modified and extended as appropriate. Also to aid in approach formulation, a conceptual framework was developed that comprises a derivative and an integrative process. The derivative process involves determination of the personnel performance requirements (job standards) imposed by a particular system design on associated personnel/equipment functional units; whereas the integrative process involves determination of the degree to which a set of available personnel capabilities can fulfill stated system requirements and the effect on system operational goals of performance levels that deviate from established performance standards.

AD-609 801 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Pittsburgh Univ., Pa.
AN EVALUATION OF MULTIPLE TRACKS IN A LINEAR PROGRAM.
Final rept. for Oct 61-Oct 62,
by Robert Glaser, James H. Reynolds, Theodore Harakas, A. G. Holzman, and John S. Abma. Oct 64, 22p
Contract AF33 616 7175, Proj. 1710, Task 171007
AMRL TR64 108

Unclassified report

Descriptors: (*Training devices, Teaching machines), (*Teaching machines, Psychometrics), (*Psychometrics, Teaching machines), Training, Linear systems, Learning, Psychology, Verbal behaviour, Performance (Human), Tests, Education.

Two experiments were performed to evaluate multitracking (branching) in a linear program. In experiment one, the multitracking consisted of providing additional cues at each frame for use by those students who felt unsure of their response. Results indicated no significant difference in efficiency between the regular linear program and the multitrack program. In experiment two, the multitracking consisted of large frames followed by more detailed frames whenever the student made an error. Large frames were developed by combining an average of three small frames. Again, the results indicated no difference in instructional efficiency between the regular linear program and the multitrack program. Although more errors were made on the large-step branching program, performance on criterion tests was as good as for the regular small-step linear program. Although branching seems a reasonable way to accommodate individual differences, the two methods attempted in this research did not show an advantage. More promising methods of branching might be (a) less frequent branches, at critical points in the program, and (b) large-step frames followed by special remedial frames, rather than by mere repetition of parts of the original large frame. (Author)

AD-609 802 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Pittsburgh Univ., Pa.
LEARNING SET FORMATION IN PROGRAMMED INSTRUCTION.
Final rept. for Oct 61-Oct 62,
by James H. Reynolds, Robert Glaser, and John S. Abma. Nov 64, 21p
Contracts AF33 616 7175, OE2 10 057, Proj. 1710, Task 171007
AMRL TR64 114

Unclassified report

See also AD-609 801.

Descriptors: (*Training devices, Teaching machines), (*Teaching machines, Psychometrics), (*Psychometrics, Teaching machines), Training, Learning, Psychology, Verbal behaviour, Performance (Human), Tests, Education.

Two different orders of three units of programed instruction were administered to groups of students matched on (a) intelligence or (b) relevant achievement

tests. Comparisons were made between groups that were (a) high or (b) average on each matching variable. The hypotheses being tested were that after varied amounts of prior practice in programed instruction, (a) learning set formation would not be demonstrated by the high intelligence and high achievement groups, and (b) learning set formation would be demonstrated by the average intelligence and average achievement groups. Only partial support was obtained for each hypothesis. The data indicated the following: (a) In a programed sequence, error rate is a more appropriate measure than achievement for observing learning set formation. (b) Learning set formation is observable in programed instruction for all learners regardless of individual differences. Since, reduced error rate was the indication of learning set formation, the phenomenon can be measured only in programs involving a moderately high error rate. (c) Since error rate differed for some of the experimental groups while achievement remained the same, the results were interpreted to mean that a moderately high error rate program which offers opportunity for correction of response errors may be as effective in producing learning as a low error rate program which confirms correct responses. (Author)

24. Photography and Other Reproduction Processes

AD-609 768 Div. 24, 8, 25, 26
OTS Prices: HC $3.00/MF $0.75

RCA Defense Electronic Products, Princeton, N. J.

RESEARCH AND DEVELOPMENT ON PHOTOCONDUCTIVE PHOTO-TAPE.
Interim rept. no. 4, 1 Aug-30 Oct 64,
by F. J. Bingley, S. Gray, E. Levin, T. H. Moore, and P. C. Murray. Dec 64, 60p
Contract AF33 657 11485, Proj. 6263, Task 626302
Unclassified report

See also AD-605 366.

Descriptors: (*Photoelectric materials, Tapes), (*Electrophotography, Aerial cameras), (*Aerial cameras, Electrophotography), Electron optics, Electron guns, Electron beams, Camera lenses, Vacuum apparatus, Focusing, Resolution, Feedback, Arsenic alloys, Antimony alloys, Sulfur compounds, Selenium alloys, Life expectancy, Signal-to-noise ratio, Manufacturing methods, Models (Simulations).

The fourth interim engineering report on a continued program of research and development on photoconductive Photo-Tape is presented. The purpose of this research and development effort is to advance the Photo-Tape program toward a flight demonstration-model camera and to demonstrate a higher level of system performance in the laboratory than that which has been possible in the past. The over-all engineering objectives can be divided into two primary areas, the first of which is the demonstration of specified performance levels in terms of available hard copy records out of the reproducer, using the laboratory models available. The second is to demonstrate the feasibility of building higher performance cameras based on the Photo-Tape concept by employing laboratory models of individual components.

25. Physics

AD-609 439 Div. 25
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ON THE STEADY STATE OF IONIZATION IN WEAKLY IONIZED PLASMA IN THE NON-EQUILIBRIUM STATE,
by E. Matsuura. Dec 64, 15p
RSIC 333; TT 65 60473

Unclassified report

Trans. of Denki Shikensho Iho (Japan) 1963, v. 27, no. 7, p. 491-495.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plasma medium, Ionization), (*Ionization, Equations of state), Density, Plasma physics, Ions, Recombination reactions, Mathematical models, Statistical functions, Electrons, Quantum statistics.

When the non-equilibrium system is maintained by the use of something external, it is the stationary state of ionization arising from the equilibrium of the ionization and recombination rates. In this situation, the relationship of degree of ionization suitable to Saha's formula can be followed. In effect, this is the problem of generalizing the Saha formula. The generalized Saha formula was derived. As an example of its use, a very simplified model was treated. The result shows that when the temperature of the electron is greater than that of the neutral atom (the gas temperature), the ionization density increases.

AD-609 462 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Brown Univ., Providence, R. I.
A. C. SOLENOID OF FINITE LENGTH IN A CONDUCTING MEDIUM WITH HALL CONDUCTIVITY,
by Suha Selamoglu and Paul F. Maeder. Jun 64, 85p WT(BU)-40
Contract AF49 638 1295
AFOSR 64 2028

Unclassified report

Descriptors: (*Plasma medium, Electrical conductance), (*Solenoids, Plasma physics), Electric fields, Magnetic fields, Hall effect, Electrical impedance, Coils, Voltage, Conductivity, Boundary layer, Calibration, Differential equations, Bessel functions, Integral transforms, Special functions (Mathematical), Shock tubes, Boundary value problems, Vector analysis, Partial differential equations, Numerical analysis.

The electric field due to an alternating current carrying solenoid was investigated by the field approach. The solenoid was assumed to be in an infinite, uniform, conducting medium, which may exhibit the Hall effect caused by a constant, axial, external magnetic field. Both the infinite and finite coil problems were studied. Explicit solutions to the infinite coil were found while the finite coil solutions were obtained in integral form. From the latter, the coil impedance and the voltage induced in a particular wire loop were calculated numerically for different scalar and Hall conductivities at different length-to-diameter ratios. Some experimental evidence for the calculated values of the impedance without the Hall effect also was found. (Author)

AD-609 479 Div. 25, 14
OTS Prices: HC $4.00/MF $1.00

Westinghouse Research Labs., Pittsburgh, Pa.
SOME RECENT ADVANCES IN MICROWAVE PHONON GENERATION AND DETECTION WITH APPLICATIONS TO THE STUDY OF PHONON-LATTICE INTERACTIONS IN DIELECTRIC MATERIALS.
Final rept. for Jul 61-Oct 64,
by John de Klerk. 31 Oct 64, 145p WRL-64-9F5-108-P2
Contract AF19 604 8826, Proj. 4600, Task 460003
AFCRL 64 904

Unclassified report

See also AD-434 757.

Descriptors: (*Phonons, Dielectrics), (*Dielectrics, Phonons), (*Cavity resonators, Phonons), (*Ultrasonic radiation, Piezoelectric transducers), Quartz, Magnesium compounds, Titanium compounds, Aluminium compounds, Oxides, Single crystals, Crystal lattices, Resonance, Microwaves, Excitation, Attenuation, Tuning devices, Vapor plating, Films, Impedance matching.

Some recent advances in phonon generation and detection in the gigacycle region are described. The technique, as applied to quartz, has been extended to non-piezoelectric materials by the use of vapor deposited thin film piezoelectric transducers. Attenuation measurements in quartz, MgO, TiO2 and Al2O3 are described and discussed. A theory for the behavior of attenuation as a function of temperature is also given. (Author)

AD-609 482 Div. 25
OTS Prices: HC $4.95/MF $2.25

Space Sciences Lab., Litton Systems, Inc., Beverley Hills, Calif.
RESEARCH ON ELECTROMAGNETIC PLASMA ACCELERATION.
Final rept. for 15 Dec 59-31 Oct 63,
by A. S. Penfold and R. M. Rosen. Jun 64, 494p
SSL(LSI) Pub-3484
Contract AF49 638 759
AFOSR 64 1340

Unclassified report

Descriptors: (*Plasma medium, Acceleration), (*Traveling-wave tubes, Plasma physics), Magnetic fields, Gas ionization, Plasma oscillations, Magnetic pinch, Electromagnetic fields, Electromagnetic pulses, Transformers, Capacitors, Coils, Kerr cells, Charged particles, Scattering, Monitors, Analog computers, Equations, Bessel functions, Stochastic processes, Control systems, Special functions (Mathematical).

A final report on work covering four years of investigation is presented. Included in this report are the following: (a) An experimental investigation of the acceleration of plasma toroids in a pulsed traveling wave device. (b) A theoretical investigation of the behavior of plasma in axially-symmetric magnetic fields. (c) A detailed description of a CW polyphase-driven traveling wave accelerator. In addition there are a number of appendices describing various ancillary techniques and apparatuses including polyphase monitoring and control systems, an analog computer for axially-symmetric magnetic fields, and the CW power sources. (Author)

AD-609 523 Div. 25, 9, 15
OTS Prices: HC $3.00/MF $0.75

Aeroelastic and Structures Research Lab., Mass.

Inst. of Tech., Cambridge.
A LAGRANGIAN FINITE DIFFERENCE METHOD FOR TWO-DIMENSIONAL MOTION INCLUDING MATERIAL STRENGTH.
Technical rept. for 30 Sep 62-24 Jun 64,
by Walter Herrmann. Nov 64, 106p ASRL-106-2
Contract AF29 601 4601, Proj. 5776, Task 577601
WL TR64 107

Unclassified report

Prepared in cooperation with the Computation Center, Mass. Inst. of Tech., Cambridge.

Descriptors: (*Numerical methods and procedures, Motion), (*Motion, Solids), (*Difference equations, Numerical analysis), Fluid mechanics, Compressible flow, Stability, Elasticity, Plasticity, Materials, Mechanical properties, Explosive materials, Pentolite, Detonation, Impact shock, Momentum, Energy, Tensor analysis, Differential geometry.

One- and two-space dimensional finite-difference schemes for the Lagrangian numerical solution of problems in the motion of solids, including material strength, are presented. Two-dimensional rectangular cartesian or cylindrically symmetric problems may be handled. Results of sample calculations are appended to illustrate the effect of material strength. (Author)

AD-609 529 Div. 25, 15, 30
OTS Prices: HC $3.00/MF $0.75

Parke Mathematical Labs., Inc., Carlisle, Mass.
TOROIDAL WAVE FUNCTIONS AND THEIR APPLICATION TO THE FREE-FLOODING RING TRANSDUCER.
Scientific rept. no. 2,
by Charles H. Sherman and N. G. Parke. Dec 64, 63p
Contract N140 70024 75686B

Unclassified report

See also AD-601 418.

Descriptors: (*Transducers, Field theory), (*Field theory, Transducers), Acoustic properties, Numerical analysis, Special functions (Mathematical), Rings, Partial differential equations, Geometric forms, Integral equations, Topology, Sound, Potential theory, Model theory.

Solutions of the wave equation have been derived in toroidal coordinates which can be used to solve the problem of acoustic radiation from a torus. The wave equation is not separable in toroidal coordinates and special methods are required to obtain solutions. Weston's solutions are not orthogonal functions, which also requires special methods in applying them to radiation problems. However, the special case of a torus of infinitesimally thin cross section can be solved by the usual methods, and in this report this thin torus problem is worked out in detail. The usefulness of this problem as a theoretical model for free-flooding ring transducers is shown by comparison of calculations and measurements. The calculation of toroidal wave functions is also discussed, and numerical results are given for those functions which are needed in transducer problems. (Author)

AD-609 552 Div. 25
OTS Prices: HC $1.00/MF $0.50

Pennsylvania Univ., Philadelphia.
A PROBABILITY DENSITY COMMON TO MOLECULAR FIELD AND COLLECTIVE EXCITATION THEORIES OF FERROMAGNETISM.
Technical rept. no. 19,
by H. B. Callen and S. Shtrikman. Nov 64, 10p
Contract Nonr55136

Unclassified report

Descriptors: (*Field theory, Nuclear spins), (*Excitation, Nuclear spins), (*Ferromagnetism, Field theory), (*Magnetism, Field theory), Anisotropy, Magnetostriction, Crystal lattices, Ions, Green's function, Brillouin zones, Mathematical analysis.

Molecular field theory is frequently used to relate the higher moments <(S to the z power) to the n power > to the first moment < S to the z power >, the latter quantity being known from empirical magnetization data. The results are in excellent agreement with experiment, despite the glaring inadequacies of molecular field theory. It is shown that the functional dependence of <(S to the z power) to the n power > on <S to the z power > follows only from a particular feature of molecular field theory, which has much wider generality and validity. The same result is obtained in all quasi-independent collective excitation theories. This fact is corroborated in decoupled Green function theories, and is used to simplify the form of these latter theories. (Author)

AD-609 562 Div. 25, 14, 17
OTS Prices: HC $7.00/MF $3.50

Martin Marietta Corp., Denver Colo.
CRYOGENIC MATERIALS DATA HANDBOOK,
by F. R. Schwartzberg, S. H. Osgood, R. D. Keys, and T. F. Kiefer. Aug 64, 724p
Contract AF33 657 9161, Proj. 7381, Task 738106
ML TDR64 280

Unclassified report

This is a complete revision of PB-161 093-1, PB-161 093-2, PB-161 093-3, PB-161 093-4, PB-161 093-5, PB-171 809, PB-171 809-1, PB-171 809-2, PB-171 809-3, PB-171 809-4, PB-171 809-5, PB-171 809-6, and PB-181 671. Continuation of Contract AF04 647 59 3.

Descriptors: (*Cryogenics, Materials), (*Aluminum alloys, Cryogenics), (*Stainless steel, Cryogenics), (*Titanium alloys, Cryogenics), (*Alloys, Cryogenics), (*Plastics, Cryogenics), (*Handbooks, (Cryogenics), Physical properties, Mechanical properties, Loading (Mechanics), Thermal conductivity, Resistance (Electrical), Titanium, Nickel alloys, Cobalt alloys, Data, Steel, Chromium alloys, Molybdenum alloys, Maraging steels, Copper, Copper alloys, Beryllium alloys, Brass, Nylon, Halocarbon plastics, Epoxy plastics, Phenolic plastics, Polyester plastics, Silicone plastics, Glass textiles.

The completely revised 'Cryogenic Materials Data Handbook' presently contains mechanical and physical property data on 62 metallic and nonmetallic materials organized in eight sections. The Handbook also contains material, property, and accumulative indices and reference list. Progress reports to update and maintain the Handbook will be issued semiannually. (Author)

AD-609 567 Div. 25
OTS Prices: HC $4.00/MF $1.00

Microwave Lab., Stanford Univ., Calif.
A STUDY OF THE PLASMA BOUNDARY.
Interim technical rept.,
by R. S. Harp. Oct 64, 130p
Contract AF33 616 8121, Proj. 7073, Task 7073 03
ARL 64 138

Unclassified report

Descriptors: (*Plasma sheath, Electric fields), Electron beams, Radiofrequency, Voltage, Microwaves, Propagation, Attenuation, Resonance, Probes (Electromagnetic), Phase (Electronics), Equations, Electromagnetic fields, Plasma medium, Boundary layer, Plasma oscillations, Differential equations, Integration, Boundary value problems, Plasma physics.

This study is concerned with an experimental investigation of the static and dynamic properties of the plasma sheath. The basic experimental technique was to pass an electron beam through the sheath parallel to the wall and, by measuring the deflection of the beam, transverse dc and rf electric fields in the sheath are measured. Measurements of the dc fields are compared with a theory based on a solution of the complete plasma-sheath equation. By means of this comparison it is possible to accurately evaluate the plasma parameters n sub e and T sub e. It is found that in the quiescent sheath, no rf fields are detected that exceed the sensitivity limit of the measurements, which is 1 v/cm. To observe the variation of externally applied rf fields through the sheath and plasma, rf voltage is applied to the plate forming the sheath, and the phase and amplitude of the resulting fields in the plasma are measured with the electron beam by using a null technique. The results are compared with a theory based on an integration of the collisionless Boltzmann equation. The boundary conditions of waves propagating in the plasma are determined by the rf properties of the sheath, and in some cases sheath losses can form the principal source of attenuation for such waves.

AD-609 579 Div. 25, 14, 30
OTS Prices: HC $5.00/MF $1.25

Corning Glass Works, Bradford, Pa.
MULTIPLE TAPPED PHOTOELASTIC DELAY LINE.
Final rept.,
by I. C. Miller. 11 Dec 64, 185p
Contract AF30 602 2060, Proj. 4506, Task 450601
RADC TDR64 434
Unclassified report

Descriptors: (*Fiber optics, Delay lines), (*Delay lines, Photoelasticity), (*Photoelasticity, Delay lines), Correlators, High frequency, Bandwidth, Signal-to-noise ratio, Performance (Engineering), Matched filters, Lasers, Transducers, Feasibility studies, Ultrasonic properties, Models(Simulations), Illumination, Potassium compounds, Sodium compounds, Niobates, Ceramic materials, Quartz, Demodulators, Diodes (Semiconductors).

The effort covered by this report is concerned primarily with the investigation of methods of improving the performance of the multiple-tapped photoelastic delay line in the areas of higher frequency operation, wider bandwidth, and increased signal-to-noise ratio. The development of the supporting components necessary to provide a practical system capability was also part of this investigation. The design and evaluation of an experimental model of a 10 megabit matched-filter is described. This device represents a practical embodiment of the photoelastic delay line technique. Operating models were produced whenever possible, and when useful information could be obtained from an operating unit. These include, in addition to the correlator mentioned above, a high intensity delay line illuminator (for a 100 usec line), a 100 channel (0.1 microsecond tap spacing) tapping device, a transistorized wideband delay line driver and a photomultiplier receiver-amplifier both operational around 15 mc/s. Designs were also obtained for the 30 mc versions of the delay line driver and receiver amplifiers. A signal-to-noise ratio of 40 db was achieved at 15 mc/s by reimaging and concentrating the arc source, however, this is not a practical method for multiple tap systems. (Author)

AD-609 584 Div. 25
OTS Prices: HC $1.00/MF $0.50

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
THERMAL EMISSION OF NEUTRAL CESIUM.
Technical note,
by P. Doody and J. Santomieri. 16 Nov 61, 16p
BSC-28252, Bendix FS-61TN-1015
Contract AF04 647 911
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cesium, Thermal radiation), (*Thermal radiation, Cesium), Electron transitions, Atomic energy levels, Probability, Intensity, Gases, Spectra (Infrared), Spectra (Visible and Ultraviolet), Quantum statistics, Tables, Exhaust gases, Solid rocket fuels.

The emission of neutral atomic cesium was investigated and its radiative characteristics calculated. The calculations for the prominent lines in the visible and infrared region are given. The radiant intensity of the most intense lines which occur in the near infra-red and visible region is presented. The 6(p)2 P3/2 goes to 6 s2 S1/2 transition as occurring at 8521.10 A constitutes the major electron transition and essentially determines the order of the total radiant energy emitted from neutral cesium gas for the temperature range considered. The integrated radiant intensity for 1000 A band widths in the near UV, visible, and near infra-red region is presented. The cesium transition probabilities are given.

AD-609 590 Div. 25
OTS Prices: HC $1.00/MF $0.50

Yale Univ., New Haven, Conn. Observatory.
BASIC EQUATIONS OF THE RELATIVISTIC TEST PARTICLE PROBLEM.
Interim technical rept.,
by S. P. S. Anand. Oct 64, 15p
Contract AF33 657 7271, Proj. 7073, Task 7073 01
ARL 64 187
Unclassified report

Descriptors: (*Plasma medium, Relativity theory), (*Relativity theory, Equations), (*Charged particles, Relativity theory), Particles, Electrons, Ions, Magnetohydrodynamics, Electromagnetic waves, Thermodynamics, Perturbation theory, Plasma physics, Electromagnetic fields.

From a completely covariant formulation, the general equations that describe density and velocity distribution as well as the electromagnetic field induced by a charged particle in the surrounding fluid are derived. Linearization is introduced as usual, but the possibility of an external magnetic field is excluded. It is shown that it is of little importance whether the test particle is relativistic or not, as long as the ensemble's mean thermal speed is small compared with the speed of light. (Author)

AD-609 597 Div. 25, 4, 9, 27
OTS Prices: HC $2.00/MF $0.50

Virginia Univ., Charlottesville.
MEASUREMENT AND PREDICTION OF DIFFUSIVITIES TO 1700K IN BINARY SYSTEMS

CONTAINING CARBON DIOXIDE.
Technical rept.,
by Thomas A. Pakurar and John R. Ferron.
Dec 64, 37p DEL-14-P
Contract Nonr362300, Proj. NR098 038

Unclassified report

Subcontracted to Delaware Univ., Newark, Grants NSF G19985, NSF GP589. Presented at the Conference on Performance of High-Temperature Systems, (3rd), Pasadena, Calif., 7-9 Dec 64.

Descriptors: (*Carbon dioxide, Diffusion), Argon, Nitrogen, Kinetic theory, High-temperature research, Molecular properties, Viscosity, Measurement, Mathematical prediction.

Binary diffusion coefficients are reported for the carbon dioxide-argon and carbon dioxide-nitrogen systems at room temperature and at 1150K to 1680K. In addition self-diffusivities of carbon dioxide for the same temperature range are given. Difficulties encountered in reconciling viscosities and diffusivities in terms of a spherically-symmetric molecular model are described. These difficulties may be overcome, so that diffusivities and viscosities may be correlated in terms of the same Lennard-Jones 12-6 potential, provided one treats the carbon dioxide molecule as a spherocylinder and employs the Curtiss-Muckenfuss calculations for rigid, spherocylindrical molecules. (Author)

AD-609 617 Div. 25, 14
OTS Prices: HC $4.00/MF $1.00

Utah Univ., Salt Lake City.
DIELECTRIC LOSS IN MgO AND SAPPHIRE.
Technical rept. no. 1, 1 Jul 63 - 30 Sep 64,
by Gary Spencer Snow and Ivan B. Cutler. Nov 64,
123p
Contract Nonr128806, Proj. NR032 469

Unclassified report

Descriptors: Sapphires, Dielectric properties), Magnesium compounds, Dielectric properties), Oxides, Single crystals, Crystals, Impurities, Measurement, Water, Absorption (Physical), Relaxation time, Heat of activation, Conductivity, Ferrites, Heat treatment.

Dielectric loss measurements were made on single crystal MgO and sapphire and on pure and doped polycrystalline MgO. The measurements were made in air and in dry argon gas at audio frequencies from room temperature to approximately 800C. Both two- and three-terminal measuring apparatus were used in the investigation. The loss was atmospheric dependent in both single crystal MgO and sapphire. The peaks were attributed to chemisorbed water on the sample. In the case of the polycrystalline MgO samples doped with more than 0.1 cation % iron, large conductivities in conjunction with a high resistance between platinum foil electrodes and sample gave rise to interfacial polarization loss peaks. The relaxation time obtained from these peaks was used as a measure of the A.C. conductivity as a function of iron concentration and sample treatment. The activation energy always increased after quenching the samples, and this increase was larger for lower iron concentrations and for faster quench treatment. The conductivity was a very complex function of sample treatment, apparently due to the fast rate of precipitation of ferrities.

AD-609 621 Div. 25, 9, 30
OTS Prices: HC $3.00/MF $0.75

General Electric Co., Philadelphia, Pa.

AN UNCOOLED, RAPID RESPONSE PROBE FOR MEASURING STAGNATION PRESSURES IN HIGH VELOCITY ARC PLASMA.
Interim technical rept. for Mar 63-Apr 64,
by P. Barkan and A. M. Whitman. Nov 64, 57p
Contract AF33 657 8206S1, Proj. 7063, Task 7063 03
ARL 64 192

Unclassified report

Descriptors: (*Test methods, Stagnation point), (*Plasma medium, Stagnation point), (*Stagnation point, Pitot tubes), (*Pitot tubes, Stagnation point), Plasma physics, Plasma oscillations, Electric arcs, Plasma jets, Gas flow, Heat transfer, Ablation, High-temperature research, Transducers, Tolerances (Mechanics), Hypersonic flow, Helium, Reynolds number, Differential equations.

A means for measuring stagnation pressures in high temperature, high current plasmas is described. The device employs a small (< .060 in. o.d.) uncooled pitot tube designed for minimum response time (< .001 sec.) which is rapidly swept through the plasma flow field (< .015 sec.). A simple technique for evaluating the transient response of the probe is described. Because the probe tip is inexpensive and expendable, a moderate amount of molten phase ablation is tolerable in the stagnation zone. Consequently, it appears possible to obtain meaningful results at heat flux rates exceeding 10,000 cal/sq. cm -sec., which is one to two orders of magnitude greater than have thus far been tolerable with water-cooled probes. In preliminary tests a single probe was successfully employed for eight successive measurements of total pressure in an atmospheric pressure, air-arc plasma at currents ranging from 200 to 1000 amperes at Mach numbers close to unity. Heat flux rates encountered are estimated to be in the vicinity of 2000-3000 cal sq./cm sec. The principle merits of the probe described are its small size, rapid response and its inexpensive, expendable probe tip.

AD-609 622 Div. 25, 9
OTS Prices: HC $3.00/MF $0.75

Heat Transfer Lab., Univ. of Minn., Minneapolis.
THERMAL CHARACTERISTICS OF A HIGH AND LOW MASS FLUX ARGON PLASMA JET.
Final technical rept.,
by C. J. Cremers and E. Pfender. Nov 64, 69p
Contract AF33 657 7380, Proj. 7063, Task 706303
ARL 64 191

Unclassified report

Descriptors: (*Plasma jets, Thermal properties), (*Argon, Plasma jets), Plasma physics, Spectrum analyzers, Mass spectroscopy, Electric arcs, Thermal radiation, Calorimeters, Radiometers, Transition temperature, Transport properties, Gas flow, Ionization, Particles, High-temperature research, Thermodynamics, Probability, Integral equations.

The thermal characteristics are determined by the plasma jets emanating from the F40 plasma torch which is manufactured by Thermal Dynamics Corp. A grating spectrometer was used to determine the temperature fields of high and low mass flux jets generated by a 400 amp arc. The temperature distributions in a cross-section close to the nozzle were determined as well for a number of other mass flows at a 400 amp current input. Also, similar distributions were obtained for the high and low mass flux cases at 600 amps. A calorimeter was used to measure the energy output of the torch for various mass flows. Additionally the radiation from the torch was measured with a radiometer. The steadiness of the turbulent high mass flux jet and the meaning of the measured temperatures are discussed in detail. (Author)

AD-609 634 Div. 25
OTS Prices: HC $1.00/MF $0.50

J. G. Engineering Research Associates, Baltimore, Md.
APPROXIMATION TO THE MEAN SQUARE FAR-FIELD PRESSURE OF RANDOMLY VIBRATING STRUCTURES AT LOW FREQUENCIES.
Technical rept. no. 12,
by Joshua E. Greenspon. Nov 64, 16p
Contract Nonr273300, Proj. NR185 300
Unclassified report

Descriptors: (*Cylindrical bodies, Acoustics), (*Sound, Cylindrical bodies), (*Structures, Vibration), Low frequency, Pressure, Mathematical analysis, Green's function.

A relation between the cross spectral density of the farfield pressure outside a surface surrounding a sound source is derived in terms of cross spectral density of the normal acceleration over a surface surrounding the source. The cross spectral density of the acceleration is given in terms of the modes of the structure. A resulting simple formula for the mean square farfield pressure in low frequency bands is derived using simple source Green's Functions. (Author)

AD-609 635 Div. 25, 13
OTS Prices: HC $1.00/MF $0.50

J. G. Engineering Research Associates, Baltimore, Md.
EFFECT OF EXTERNAL OR INTERNAL STATIC PRESSURE ON THE NATURAL FREQUENCIES OF UNSTIFFENED, CROSS STIFFENED, AND SANDWICH CYLINDRICAL SHELLS.
Technical rept. no. 11,
by Joshua E. Greenspon. Nov 64, 9p
Contract Nonr273300, Proj. NR185 300,
Unclassified report

Descriptors: (*Stiffened cylinders, Sandwich construction), (*Sandwich construction, Cylindrical bodies), (*Structural shells, Sandwich construction), Pressure, Loading (Mechanics), Vibration, Frequency, Buckling (Mechanics), Mathematical analysis, Determinants, Equations.

A general formula is given for the natural frequency of a pressurized shell which is loaded with static load on its cylindrical surface as well as along its edge. It is found that the natural frequency of the pressurized shell can be written in terms of the natural frequency of the unpressureized shell. The connection between natural frequencies and buckling load is discussed. (Author)

AD-609 636 Div. 25, 9
OTS Prices: HC $1.00/MF $0.50

J. G. Engineering Research Associates, Baltimore, Md.
RANDOM LOADING AND RADIATION FROM STIFFENED AND SANDWICH TYPE CYLINDRICAL SHELL STRUCTURES. PART II, UNSYMMETRICAL LOADING WITH KNOWN SPACE DISTRIBUTION.
Technical rept. no. 10,
by Joshua E. Greenspon. Oct 64, 12p
Contract Nonr273300, Proj. NR185 300
Unclassified report

Descriptors: (*Cylindrical bodies, Acoustics), (*Sound, Cylindrical bodies), (*Loading (Mechanics), Cylindrical bodies), Vibration, Fluid mechanics, Theory, Equations, Mathematic analysis, Fourier analysis, Series, Integral transforms, Differential equations.

This second part of the study of random loading and radiation from cylindrical shells treats the general loading on a cylindrical shell and the resulting radiation from the structure. The solution for known spatial distribution and random loading in time is given in detail. (Author)

AD-609 640 Div. 25, 10
OTS Prices: HC $2.00/MF $0.75

Hercules Powder Co., Magna, Utah.
STRESS ANALYSIS OF A CYLINDER PRESSURE-LOADED OVER EQUAL AND OPPOSITE ARCS.
by E. B. Magrab. 16 Apr 62, 53p MTO-301
Contract AF04 647 243
Unclassified report

Descriptors: (*Stresses, Mathematical analysis), (*Loading (Mechanics), Cylindrical bodies), (*Propellant grains, Stresses), Deflection, Pressure, Deformation, Shear stresses, Boundary value problems, Fourier analysis, Series, Power series, Graphics.

The objective of this work was to determine the theoretical stresses in, and deflections of, the propellant grain, when it is subjected to an arbitrary, symmetric edge pressure on the outer boundary. The results are presented graphically. A Fourier-series treatment of the theoretical problem yields mathematical results which may be used as a guide for calculating the actual stresses that may be imposed on the boundary of the XM-57 Minuteman Stage III motor through static-loading.

AD-609 643 Div. 25
OTS Prices: HC $1.00/MF $0.50

Technical Operations Research, Burlington, Mass.
THE INVESTIGATION OF PASSIVE LASER Q-SWITCHING.
Semiannual summary rept. for 1 Jul 63-1 Jan 64,
by J. I. Masters, P. Kafalas, and E. M. E. Murray.
31 Jan 64, 16p TO-B-64-15
Contract Nonr412600
Unclassified report

See also: AD-603 115.

Descriptors: (*Lasers, Optical equipment components), Pulse generators, Dyes, Photochemistry, Polycyclic compounds, Chlorides, Films, Organic nitrogen compounds, Absorption spectrum, Oscillation, Resonators, Prisms (Optics), Electric switches, Ruby.

Progress achieved on the study of passive laser Q-switching techniques is summarized. Laser Q-switching techniques afforded by electro-optical or rotating prism devices are discussed. Actually, because of the large photon flux available in a highly inverted laser such as ruby, effective Q-switching is possible using a passive solid-state or liquid component. Such a component is placed inside the resonator, contributes loss, and thus holds off the oscillation until the laser is pumped to a high predetermined inversion level. Initial lasing causes the component to become nearly transparent in a very short time, and the giant pulse is delivered with little loss from the passive Q-switching component.

AD-609 669 Div. 25, 9
OTS Prices: HC $2.00/MF $0.50

Firestone Flight Sciences Lab., Calif. Inst. o..

Tech., Pasadena.
THE STRESSES IN A CYLINDRICAL SHELL CONTAINING AN AXIAL CRACK,
by Efthymios C. Folias. Oct 64, 50p GALCIT-SM-64-13
Contract AF33 616 7806, Proj. 7063, Task 706302
ARL 64 174

Unclassified report

Descriptors: (*Elastic shells, Stresses), (*Structural shells, Stresses), (*Fracture (Mechanics), Structural shells), (*Cylindrical bodies, Structural shells), (*Stresses, Mathematical analysis), Elasticity, Loading (Mechanics), Deflection, Numerical analysis, Differential equations, Bessel functions, Functions, Boundary value problems, Integral equations, Series, Flight, Mechanics.

Using an integral formulation the coupled Marguerre equations for a cracked cylindrical shell of length 2c are solved for the in-plane and Kirchhoff bending stresses, and, among other things, it is found that the explicit nature of the stresses near the crack point depends upon the inverse half power of the non-dimensional distance from the point epsilon. The character of the combined extension-bending stress field near the crack tip is investigated in detail for the special case of an axial crack in a long closed cylindrical shell which is subjected to uniform internal pressure q sub o. Pending a complete study of the solution, approximate results for the combined surface stresses near the crack tip normal and along the line of crack prolongation are given. (Author)

AD-609 670 Div. 25, 9
OTS Prices: HC $4.00/MF $1.00

Heat Transfer Lab., Univ. of Minn., Minneapolis.
THERMODYNAMIC PROPERTIES OF CARBON-NITROGEN MIXTURES AT HIGH TEMPERATURES.
Interim technical rept.,
by Kwang-Tien Shih, Warren E. Ibele, Edgar R. F. Winter, and Ernst R. G. Eckert. Sep 64, 133p
Contract AF33 657 7380, Proj. 7063, Task 7063 03
ARL 64 149

Unclassified report

Descriptors: (*Mixtures, High temperature research), (*Carbon, Thermodynamics), (*Nitrogen, Thermodynamics), (*Gases, High temperature research), (*Thermodynamics, Tables), Molecular properties, Evapotranspiration, Plasma jets, Statistical mechanics, Data, Spectroscopy, Heat transfer, Mixtures, Graphite.

For the system carbon (graphite) and nitrogen, equilibrium composition and thermodynamic properties have been calculated using spectroscopic data. Enthalpy, constant pressure heat capacity (frozen and equilibrium), entropy, and compressibility values are tabulated over the temperature range 1000 to 15000 K and pressure range from 10 to minus 3rd power to 100 atmospheres. Enthalpy-composition charts have been prepared for the same regions. (Author)

AD-609 688 Div. 25, 13
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
BUCKLING CHARACTERISTICS OF THIN CYLINDRICAL SHELLS SUBJECTED TO AXIAL COMPRESSION AND INTERNAL PRESSURE.
Monograph series,
by J. J. Connor, Jr. 1959, 18p
WAL MS10

Unclassified report

Presented at Army Science Conference, West Point, N. Y., 24-26 June 1959.

Descriptors: (*Buckling (Mechanics), Structural shells), (*Structural shells, Buckling (Mechanics)), (*Cylindrical bodies, Buckling (Mechanics)), Compressive properties, Stresses, Thickness, Loading (Mechanics), Pressure, Theory, Experimental data, Elasticity, Plasticity.

The nonlinear axisymmetric deformation of pressurized cylindrical shells is analyzed and the Tresca Yield Condition used to establish a relationship between the limit load, defined as the axial load corresponding to the initiation of plastic action, and the internal pressure. An experimental investigation of the inelastic buckling of pressurized cylinders is also carried out. Both reinforced and unreinforced cylinders are considered; the reinforcement consisted of integral ring stiffeners. The limit load is determined for each of the unreinforced models. Agreement between the theoretical and experimental results (critical stress level and mode of failure) is favorable, indicating that the theory satisfactorily predicts the behavior of axially compressed cylindrical shells for relatively high values of the internal pressure parameter. Finally, the variation of the limiting axial load with internal pressure is evaluated for three cylinders. Comparison with the corresponding elastic buckling curves reveals that, at high values of the internal pressure parameter, plastic buckling will occur at an axial load considerably less than the elastic buckling load. (Author)

AD-609 701 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

David Taylor Model Basin, Washington, D. C.
INTRODUCTION TO NON-LINEAR MECHANICS. PART IV. RELAXATION OSCILLATIONS,
by N. Minorsky. Sep 46, 86p
DTMB 564; ATI 121 427

Unclassified report

See also PB-31 917.

Descriptors: (*Nonlinear systems, Mechanics), (*Relaxation oscillators, Theory), Nonlinear differential equations, Circuits, Oscillation, Damping, Electron tubes, Clocks, Friction, Electric arcs, Stability.

Contents: Fundamentals of the discontinuous theory of relaxation oscillations; Degenerate systems with one degree or freedom; Multiply degenerate systems; Mechanical relaxation oscillations; Oscillations maintained by periodic impulses; Effect of parasitic parameters on stationary states of dynamical systems.

AD-609 702 Div. 25, 15
OTS Prices: HC $3.00/MF $0.75

Naval Postgraduate School, Monterey, Calif.
TABLE OF THE DEBYE FUNCTIONS,
by Don E. Harrison, Jr., and John R. Neighbours.
Dec 64, 76p
NPS,M RR49

Unclassified report

Descriptors: (*Tables, Integrals), (*Integrals, Specific heat), (*Specific heat, Tables), Special functions (Mathematical), Temperature, Heat, Functions, Digital computers, Thermodynamics, Solids.

A seven place table of the Debye integral and the ratio Csub v/3R has been calculated. For Z = Theta/T in the range $1.0 < Z < 30.0$ the increment in Z is 0.01 and for the range $30.0 < Z < 100$ the increment in Z is 0.1. The three point Simpson's rule integrations were performed on a CDC 1604 computer. (Author)

AD-609 704 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Syracuse, N. Y.
SEMICONDUCTOR LASER AMPLIFIER TECHNIQUES (SEMLAM).
Final rept.
Oct 64, 41p
Contract AF30 602 3111, Proj. 4506, Task 450602
RADC TDR64 384

Unclassified report

Descriptors: (*Lasers, Semiconductors), (*Diodes (Semiconductor), Lasers), (*Amplifiers, Lasers), Oscillators, Gallium alloys, Arsenic alloys, Oxygen, Silicon compounds, Monoxides, Optical coatings, Gases, Pulse generators, Phase (Electronics), Spectrum analyzers, Transmission lines, Reflection, Refraction, Attenuation, Purification, Coatings, Stability, Equations.

Information is reported on the work done in the Semiconductor LASER Amplifier Program. A transmission type light amplifier was successfully tested. The system used consists of a light-emitting GaAs diode, with SiO antireflection coated Fabry-Perot surfaces, as an amplifier and a CW oxygen gas LASER as an oscillator. Gain of 15 db from the gas LASER beam was observed. (Author)

AD-609 722 Div. 25, 27
OTS Prices: HC $1,.25/MF $0.50

Princeton Univ., N. J.
ANALYTICAL-EXPERIMENTAL CORRELATION OF RADIATION LOSS FROM AN ARGON ARCJET.
Interim technical rept.,
by Martin P. Sherman, Paul F. Jacobs, and Jerry Grey.
Aug 64, 45p
Contract AF33 657 9962, Proj. 7063, Task 706303
ARL 64 132

Unclassified report

Descriptors: (*Plasma jets, Measurement), Argon, Gas ionization, Turbulence, Probes (Electromagnetic), Collimators, Theory, Electron transitions, Electron capture, Atomic energy levels, Bremsstrahlung, Thermodynamics, Arc-jet engines.

A previous report (AEL-621) described a series of total radiation surveys of a turbulent argon arcjet using a collimated radiation probe. The results, although based on admittedly 'rough' experiments, indicated a total radiation loss considerably less than prior theoretical predictions. In the present report, these theories are reviewed in some detail, and the entire series of experiments is re-examined, particularly with reference to the effect of collimation on the results. It was found that although the radiation distributions measured in (1) were accurate, the method used to analyze the data was incorrect. Using the same experimental data, the measured radiation loss was recalculated properly, taking into account the effect of the collimator. Results indicated a considerably larger loss than had been reported, and were found to agree quite well with the theoretical estimates given in the present report. (Author)

AD-609 724 Div. 25, 8, 15
OTS Prices: HC $3.00/MF $0.75

Purdue Univ., Lafayette, Ind., School of Electrical Engineering.
THE BORN APPROXIMATION APPLIED TO ELECTROMAGNETIC SCATTERING FROM A FINITE CONE.
Scientific rept. no. 2,
by D. B. Hodge and F. V. Schultz. Sep 64, 70p
PUSEE-TR-EE64-18
Contract AF19 628 1691, Proj. 5635, Task 563502
AFCRL 64 762

Unclassified report

See also AD-606 828.

Descriptors: (*Electromagnetic waves, Scattering), (*Radar echo areas, Conical bodies), (*Field theory, Numerical analysis), Potential theory, Electromagnetic fields, Boundary value problems, Optics, Harmonic analysis, Series, Integrals, Diffraction.

This report contains a discussion of the Kirchhoff, or physical optics, approximation used in determining the fields scattered from perfectly conducting obstacles. The basic assumptions implicit in this method are investigated and it is shown that this method fails to predict the depolarization phenomenon expected when obstacles lacking symmetry are considered. Finally, the Born approximation is applied to the determination of the fields scattered from a perfectly conducting finite cone immersed in a plane electromagnetic wave. The second Born approximation is calculated using spherical eigenfunction expansions. The numerical investigation indicates, however, that this solution converges slowly. (Author)

AD-609 726 Div. 25, 14
OTS Prices: HC $1.00/MF $0.50

McCrone Research Inst., Chicago, Ill.
DIFFUSION STUDIES IN CERAMIC CRYSTALS.
Final rept.,
by Leonid V. Azaroff. Nov 64, 10p
Contract Nonr396401

Unclassified report

Descriptors: (*Diffusion, Ceramic materials), (*Ceramic materials, Crystals), (*Crystals, Diffusion), Crystallography, Anisotropy, Crystal structure, Cadminum compounds, Zinc compounds, Sulfides, Single crystals, Vapor pressure, High-temperature research, Labeled substances.

The objectives of the present investigation have been the determination of the diffusion mechanisms operative in ceramic crystals having open structures. There is reason to believe that the diffusion mechanisms in such crystals are different from the vacancy or interstitial diffusion processes normally assumed in the case of closely packed metals, halides, and other crystals having similar dense structures. For example, a voidal diffusion mechanism was suggested to be operable in crystals having the relatively open wurtzite and sphalerite structures. It was also shown that diffusion should be anisotropic in such crystals and, based on the somewhat scanty experimental data then availabe, it was demonstrated that diffusion should be anisotropic in these crystals and, in fact, estimates were made of the magnitude of the anisotropic activation energies and found to be in agreement with published data. Thus a secondary objective of the present investigation has been the correlation of anisotropies in crystal structure to anisotropies in the diffusion processes.

AD-609 730 Div. 25, 26
OTS Prices: HC $2.00/MF $0.50

Midwest Research Inst., Kansas City, Mo.
THE STRUCTURE AND STRENGTH OF EPITAXIAL FILMS.
Final rept. for 17 Oct 63-17 Nov 64,

by Melvin Lavik, Paul Stablein, and Paul J. Bryant.
5 Jan 65, 48p
Contract NOw64 0061d, Proj. 2742P

Unclassified report

Descriptors: (*Evaporators, Metal films), (*Metal films, Vapor plating), Vacuum systems, Evaporation, Epitaxial growth, Composite materials, Gold, Silver, Mica, Sodium compounds, Chlorides, Tensile properties, Test equipment, Compressive properties, Strain (Mechanics), Elasticity, Bibliographies.

An ultra-high vacuum evaporator system was developed for depositing pure, epitaxial films. Pressures of 10 to the -10 power torr have been obtained. A tensile test device was incorporated to permit straining the film-substrate composites while still in the clean UHV environment. Preliminary load-displacement curves were obtained for polycrystalline silver substrates with and without gold films. Techniques were investigated for separating gold films from mica and sodium chloride substrates. An apparent grown-in compressive strain was observed as the film is relieved during separation from a sodium chloride substrate. Preliminary tensile tests of these free-films were conducted. Recommended future experiments as well as recommended modifications of equipment and techniques are given. Appended is a bibliography of literature references pertinent to this project with a coded notation of primary subject matter. (Author)

AD-609 738 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
ON STABILITY CRITERIA OF EXPLICIT DIFFERENCE SCHEMES FOR CERTAIN HEAT CONDUCTION PROBLEMS WITH UNCOMMON BOUNDARY CONDITIONS.
Technical memo.,
by Arnold N. Lowan. 28 Sep 59, 13p RAD-9-TM-59-69
Contract AF04 647 305, Proj. WS107A2
AFBMD TN59 23

Unclassified report

Prepared in cooperation with Yeshiva Univ., New York.

Descriptors: (*Rectangular bodies, Thermal conductivity), (*Thermal conductivity, Numerical analysis), Stability, Difference equations, Differential equations, Matrix algebra, Vector analysis, Heat transfer, Thermal diffusion, Vibration, Cylindrical bodies, Spheres, Surfaces, Boundary value problems.

It is shown that the stability criteria for the explicit and implicit schemes appropriate to the differential equations governing the flow of heat and the vibration in a cylinder and sphere are identical with those derived for a slab. (Author)

AD-609 759 Div. 25, 2, 30
OTS Prices: HC $1.00/MF $0.50

Barkley and Dexter Labs., Inc., Fitchburg, Mass.
LASER ACTIVITIES AND BACKGROUND RADIATION STUDIES.
Scientific rept. no. 1,
by Robert L. Iliff. Jul 63, 22p
Contract AF19 604 8852, Proj. 7600, Task 760006
AFCRL 64 1003

Unclassified report

Descriptors: (*Lasers, Geodesics), (*Geodesics, Lasers), (*Range finding, Lasers), Background, Radioactivity, Noise, Pumping (Electronics), Flash lamps, Photomultipliers, Illumination, Ruby, Satellites (Artificial), Ranges (Distance), Moon, Geophysics.

Development of laser cavities for use in geodetic studies is reviewed, and experiments for the determination of background radiation from various sources are described. Laser studies include the design of laser cavities employing several different configurations for light pumping. These include three helical flashlamp configurations and one annular flashlamp configuration. Descriptions of the difficulties encountered in the design of these cavities and reports of the threshold and output energies are given. Preliminary reports of ranging techniques using the laser are given. These reports contain information from two field tests: one between two buildings of AFCRL at Bedford, Mass., and one between AFCRL, Bedford, Mass. and Mt. Wachusett (Princeton, Mass.). A triggering technique planned for increasing the accuracy of timing necessary in ranging is discussed, and a summary of the accuracies and uncertainties of this system are given. Results of daytime experiments and background radiation studies are given. Experiments were performed on the measurement of noise from the moon, but these results are inconclusive. (Author)

AD-609 760 Div. 25, 14
OTS Prices: HC $2.00/MF $0.50

Brown Univ., Providence, R. I.
EXTENDED DISPLACEMENT BOUND THEOREMS FOR WORK HARDENING CONTINUA SUBJECTED TO IMPULSIVE LOADING.
Rept. no. 5,
by J. B. Martin. Oct 64, 31p
Contract N189 181 57827A X

Unclassified report

Descriptors: (*Continuum mechanics, Theorems), (*Loading (Mechanics), Hardening), Deformation, Mechanical properties, Stability, Dynamics, Numerical analysis, Integral equations, Materials, Solids.

Earlier work presenting a technique for bounding displacements following impulsive loading in inelastic continua is extended to give more powerful results for stable work hardening materials. The extension is achieved by adding a self-evident statement regarding the material behavior to Drucker's postulate of stability for time independent, path dependent solids. (Author)

AD-609 769 Div. 25
OTS Prices: HC $4.00/MF $1.00

Quantum Electronics Lab., Calif. Inst. of Tech., Pasadena.
AN ANALYSIS OF PERTURBED CONFOCAL RESONATORS.
Scientific rept. no. 3,
by J. F. Asmus. Sep 64, 141p
Contract AF49 638 1322
AFOSR 64 2074

Unclassified report

Descriptors: (*Resonators, Mirrors), (*Mirrors, Resonators), (*Lasers, Resonators), Mathematical logic, Perturbation theory, Statistical functions, Statistical analysis, Integral transforms, Quartz resonators, Optical equipment, Interferometers, Green's function.

An analytical technique is developed for computing mode functions and associated diffraction losses of perturbed multimode optical resonators. It is based upon

a consistent field formulation of resonance in an open two-mirror system. To illustrate the method the theory of confocal resonators is extended to include configurations differing from the confocal case by small geometrical perturbations. This involves computing and expanding a perturbed Green's function for such near confocal resonators. Diffraction losses for certain statistical and deterministic perturbations are computed and related to disturbances arising from an imperfect figure, polish or alignment of the mirrors. The design and construction of a stable laser spectrometer consisting of a single mode tuneable gas laser and a swept interferometer are described. Measurements of the diffraction losses of perturbed confocal resonators are found to be in agreement with the above analysis. (Author)

AD-609 780 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NONSYMMETRICAL BUCKLING OF A FLAT ROUNDED SHELL WITH INITIAL DEFORMATION FROM EXTERNAL PRESSURE,
by Ivan Hlavacek. 2 Dec 64, 16p
FTD TT64 354; TT 65 60592

Unclassified report

Unedited rough draft trans. of Aplikace Matematiky (Czechoslovakia) 1963, v. 8, no. 6, p. 399-410.

Descriptors: (*Buckling (Mechanics), Structural shells), (*Structural shells, Deformation), Pressure, Loading (Mechanics), Polynomials, Mathematical analysis, Functions, Strain (Mechanics), Czechoslovakia, Spheres.

Algebraic equations are derived for computing the characteristics of load strain of the hinge-supported flat spherical shell, subjected to equally distributed external pressure, and which has a nonsymmetrical initial buckling. (Author)

AD-609 785 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTROPHYSICAL PROPERTIES OF CERTAIN AROMATIC BETAINES,
by V. P. Parini and A. M. Simonov. 28 Nov 64, 8p
FTD TT64 394; TT 65 60585

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR, Izvestiya. Seriya Khimicheskaya, 1963, no. 3, p. 446-450.

Descriptors: (*Semiconductors, Organic compounds), Aromatic compounds, Salts, Electrical properties, Heat of activation, Polarization, Electric currents, Permeability (Magnetic), Dielectric properties.

1. A study was made of the electrophysical properties of a number of aromatic betaines which did not have bonding between charged atoms. 2. The dielectric permeability of the substances studies proved to be somewhat higher in comparison with the majority of organic compounds and lay within the limits 2.9 - 3.9. 3. The temperature dependence of the betaines taken is described by the usual exponential law for organic substances. 4. Internal molecular variations which result in easier excitation of the electron system lead as a rule to a lowering of the 'activation energy' of conductivity. (Author)

AD-609 786 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EQUILIBRIUM OF FLEXIBILE ELASTIC-PLASTIC SHELLS AND PLATES,
by M. F. Ershov. 25 Nov 64, 14p
FTD TT64 420; TT 65 60586

Unclassified report

Unedited rough draft trans. of Prykladna Mekhanika (USSR) 1962, v. 8, no. 5, p. 489-499.

Descriptors: (*Structural shells, Deformation), (*Sheets, Deformation), Loading (Mechanics), Stresses, Elasticity, Plasticity, Mathematical analysis, Moments.

At a certain stage of stressing shells and plates, plastic deformations originate in their materials. In many instances plastic deformations sharply change not only the quantitative, but also the qualitative work picture of plates and shells. (Author)

AD-609 812 Div. 25
OTS Prices: HC $3.00/MF $0.75

Plasmadyne Corp., Santa Ana, Calif.
A FUNDAMENTAL THEORETICAL AND EXPERIMENTAL STUDY OF ROTARY MAGNETOHYDRODYNAMICS,
Final rept.,
by Victor A. Erma and Boris Podolsky.
21 Jan 64, 95p FR113-1149
Contract AF49 638 1149, Proj. 9752, Task 9752 01
AFOSR 64 2475

Unclassified report

Descriptors: (*Magnetohydrodynamics, Rotation), Vortices, Incompressible flow, Compressible flow, Mercury, Helixies, Electrical conductance, Magnets, Electrodes.

A combined theoretical and experimental investigation of the magnetohydrodynamics of a magnetically driven vortex, including both a closed cycle (homopolar) and open cycle (helical) configuration, constructed in this laboratory, was made. The theory of the magnetohydrodynamics of the homopolar device for the general case of an incompressible conducting fluid is presented, and the resulting system of equations simplified appreciably. Detailed discussions of the two special cases of very high and very low conductivity are given. The cases of a homopolar device with a compressible fluid, and a helical device with an incompressible fluid are likewise discussed in a preliminary manner. A detailed experimental study of the homopolar device, including exhaustive measurements of the static pressure, azimuthal and radial velocities, boundary layer behavior, and the effect of a changing electrode radius was made. The experimental work concerned with the helical device was preliminary, and was limited to measurements of the net outflow velocity. (Author)

AD-609 816 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

Polytechnic Inst. of Brooklyn, N. Y.
THERMOELECTRIC POWER OF THE TRANSITION METAL DIBORIDES,
Technical rept. no. 4,
by Joseph Segre. 1961, 38p
Contract Nonr83912, Proj. NR032 414

Unclassified report

Descriptors: (*Borides, Thermoelectricity), (*Thermoelectricity, Borides), Transition elements, Solid solutions, Hall effect, Thermochemistry, Electrochemistry, Temperature, Metallic crystals, Alloys.

The thermoelectric power and its temperature dependence for solid solutions of diborides of the fourth- and fifth- column transition metals was measured. The results show a systematic change with concentration of the solid solutions but cannot be explained on the basis of the simple one band model which is in agreement with the Hall constant and resistivity data over most of the concentration range. No systematic porosity dependence, observed in the results of the other conduction properties, was evident here. A comparison with the silver palladium alloy system, correcting for the difference in s-d band overlap for the two systems, shows similar behavior for both the Hall effect as well as for the present data. Hence, while the thermoelectric power data could not be used to confirm the simple model initially assumed, it does, however, exhibit behavior analogous to date for pure transition metals and their alloys. (Author)

AD-609 828 Div. 25, 8, 14, 17
OTS Prices: HC $3.00/MF $0.75

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOLID STATE RESEARCH.
Rept. for 1 Jul-30 Sep 64,
17 Dec 64, 74p
Contract AF19 628 500
ESD TDR64 561
Unclassified report

See also AD-606 126.

Descriptors: (*Solid state physics, Reviews), (*Lasers, Solid state physics), (*Magnetic resonance, Solid state physics), (*Spectroscopy, Solid state physics), Luminescence, Plasma medium, Gallium alloys, Arsenic alloys, Diodes (Semiconductor), Crystals, Recrystallization, Furnaces, Raman spectroscopy, Infrared radiation, Electron beams, Refractive index, Gas discharges, Band spectrum, Ruby, Semiconductors, Materials, Magnetism.

This report covers in detail the solid state research work at Lincoln Laboratory for the period 1 July 1964 through 30 September 1964. The topics covered are Solid State Device Research, Laser Research, Materials Research, Band Structure and Spectroscopy of Solids, and Magnetism and Resonance. (Author)

AD-609 831 Div. 25, 4, 8
OTS Prices: HC $2.00/MF $0.50

Army Electronics Command, Fort Monmouth, N. J.
ELECTRONICALLY FUNCTIONAL ORGANIC MATERIALS.
Technical rept.,
by Gerhardt Platau, Wayne R. Wenger, and Emile Beekman. Sep 64, 34p ECOM-2508
Proj. 1C0 24401A112, Task 1C0 24401A112 05
Unclassified report

Descriptors: (*Semiconductors, Organic compounds), (*Organic compounds, Semiconductors), Ferrocenes, Nickel compounds, Diene synthesis, Cyclopentane, Spectroscopy, Nuclear magnetic resonance, Conductivity, Infrared radiation, Absorption, Molecular structure, Synthesis (Chemistry), Organic materials.

The syntheses of fourteen compounds based of ferrocene, nickelocene, and cyclopentadiene are described. The infrared spectra for these compounds are shown. Conductivity and electron spin resonance absorption measurements performed on these and twelve other compounds obtained from external sources indicate poor electronic activity for most of these materials. The application of these compounds and organic compounds in general as active elements in electronic devices is discussed. (Author)

AD-609 834 Div. 25, 7, 27
OTS Prices: HC $1.00/MF $0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
INDUCTIVE PLASMA HEATING USING A MULTI-TURN COIL.
Technical information series,
by Edward F. Gibbons and David B. Miller. Nov 64, 18p R64SD76
Unclassified report

Descriptors: (*Plasma medium, Induction heating), (*Induction heating, Plasma medium), Heaters, Coils, Inductance, Capacitance, Argon, Plasma engines.

Earlier inductive plasma studies have resulted in very low energy efficiency systems. The purpose of this study was to investigate the effects of increased coil inductance and increased coil 'filling' on system efficiency. Although the new coil inductance accounted for only slightly over 50% of the total circuit inductance, over 27% of the stored energy was coupled into the plasma under proper conditions. Capacitance was 10 micro fd, voltages of 6, 7 and k kv were employed, and argon over the pressure range 80-500 microns, was used as the test gas. (Author)

AD-609 837 Div. 25, 9, 20
OTS Prices: HC $1.00/MF $0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
DISTORTED WAVE CALCULATION OF ROTATIONAL EXCITATION OF N2 BY SLOW ELECTRONS.
Technical information series,
by R. C. Mjolsness and D. H. Sampson. Nov 64, 11p R64SD78
Contract Nonr418800, Proj. NR061 147
Unclassified report

Prepared in cooperation with Los Alamos Scientific Lab., N. Mex.

Descriptors: (*Excitation, Nitrogen), (*Rotation, Diatomic molecules), (*Diatomic molecules, Excitation), (*Nitrogen, Excitation), (*Electrons, Inelastic scattering), Perturbation theory, Plasma physics, Molecular rotation, Molecular properties, Quadrupole moments, Differential cross section, Electrical properties, Quantum mechanics, Polarization, Distortion, Field theory, Ions, Gases.

Rotational excitation is usually an important energy loss mechanism for low energy (< 1ev) electrons in a slightly ionized gas and can be very significant in determining its electrical properties. For N2, which is probably of greatest practical interest, there have existed some uncertainties in the value for the rotational cross section and some discrepancies between theory and experiment. This note shows that these difficulties can be resolved.

AD-609 838 Div. 25, 9
OTS Prices: HC $2.00/MF $0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
CHOICE OF AN APPROPRIATE MEAN ABSORPTION COEFFICIENT FOR USE IN THE GENERAL GREY GAS EQUATIONS.
Technical information series,
by D. H. Sampson. Nov 64, 35p R64SD77
Contract Nonr418800, Proj. NR061 147
Unclassified report

Descriptors: (*Transport properties, Numerical analysis), (*Numerical analysis, Transport properties), (*Absorption, Photons), Gases, Optical properties, Thickness, Electromagnetic waves.

An approximate method for conveniently treating radiative transport in the intermediate regime in which a gas is neither optically thin nor optically thick is described. The method consists of using the general grey gas equations with the mean absorption coefficient chosen to be a function of optical thickness such that it decreases monotonically with increase in optical depth from the Planck mean absorption coefficient K sub P when the gas is very optically thin to the Rosseland mean absorption coefficient K sub R when the gas is very optically thick. Numerical results for the flux and the divergence of the flux obtained by this approximate method are compared with those obtained by an exact treatment for various optical thicknesses assuming free-free absorption and a linear temperature gradient. In this case where the frequency dependence of the absorption coefficient is strong enough that K sub P is approximately 30 K sub R, the results by our approximate method are nearly always within a factor of 2 of the correct values. (Author)

AD-609 846 Div. 25, 30
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
APPLICATIONS OF LASERS.
Special reports,
by C. Martin Stickley. Nov 64, 43p
Proj. 4645
AFCRL 64 914; AFCRL SR15
Unclassified report

A shorter version of a paper prepared for a seminar on lasers held in August 1964 at New York City under the sponsorship of the Education and Research Association.

Descriptors: (*Lasers, Symposia), Instrumentation, Communication systems, Space communication systems, Metallurgy, Machining, Medical research, Biology, Retina, Ruby, Tracking, Acoustics, Roman spectroscopy, Electron optics, Computers, Photography, Defense systems.

Fundamentally this article is a survey of applications of lasers. The applications are divided into six major areas: precision measurements, communications, biological and medical, other scientific areas, metal-working, and miscellaneous. A table of the basic characteristics of the major types of lasers is provided so that the user can be made aware of the limitations and capabilities of lasers. Good examples of applications in each of these areas are described in some detail to illustrate which major properties of laser radiation are useful in that particular area. Most of the discussion pertains to present-day applications but in some instances what appear to be good future applications are also described. Seventy-two references to the technical literature that relate to applications are provided. (Author)

AD-609 847 Div. 25
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
DISPERSION ANALYSIS OF OPTICAL REFLECTIVITY.
Physical sciences research papers,
by Alfred Kahan. Nov 64, 24p
Proj. 5621
AFCRL 64 912; AFCRL PSRP65
Unclassified report

Descriptors: (*Reflection, Optical properties), (*Optical properties, Measurement), (*Crystals, Optical properties), Dielectric properties, Infrared radiation, Crystal lattices, Vibration, Magnesium compounds, Tin alloys, Calcium compounds, Fluorides, Integrals, Electromagnetic waves, Programming (Computers), Magnesium alloys, Semiconductors.

Methods of obtaining the optical constants of a material from the analysis of the reflectivity spectrum are given. Both the Kramers-Kronig integral relations and the classical oscillator theory are discussed and applied to the infrared lattice vibration data of Mg2Sn and CaF2.

AD-609 848 Div. 25
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
A STUDY OF A SCINTILLATION MECHANISM.
Physical sciences research papers,
by Kurt Toman. Nov 64, 18p
Proj. 5631
AFCRL 64 942; AFCRL PSRP71
Unclassified report

Paper presented at AGARD Ionospheric Research Committee Symposium (9th) Copenhagen, Denmark, 26-29 Aug 64.

Descriptors: (*Light, Frequency modulation), (*Optical phenomena, Electromagnetic wave reflections), Electromagnetic waves, Doppler effect, Mercury lamp, Mirrors, Rotation, Light transmission, Interferometers, Optics.

Scintillation was observed during an experiment with an Hg 198 light, a rotating mirror, and a Fabry-Perot interferometer. The mechanism postulated for the phenomenon is an acceleration component in the ray path, caused by curvatures within the mirror surfaces. (Author)

AD-609 849 Div. 25
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
AUTOIONIZATION SPECTRA OF GASES OBSERVED IN THE VACUUM ULTRAVIOLET.
Physical sciences research papers,
by Robert E. Huffman. Nov 64, 45p
Proj. 8627
AFCRL 64 911; AFCRL PSRP66
Unclassified report

Descriptors: (*Gases, Spectra (Ultraviolet)), (*Absorption spectrum, Gases), Atomic energy levels, Helium, Helium group gases, Alkali metals, Alkaline earth metals, Vapors, Ionization potentials, Ionization, Thallium, Line spectrum, Calcium, Lead, Krypton, Xenon, Argon.

This report first gives a brief introduction and survey

of the previous work on discrete structure in the ionization continua of atomic gases observed by absorption spectroscopy at photon energies less than about 20 ev (600 A). The discrete structure observed is generally due to autoionization. The spectra of metal vapors such as the alkali and alkaline earths, and of the rare gases, argon, krypton, and xenon will be discussed. After this introduction, recent measurements in this laboratory of the absorption coefficients (cross sections) of the rare gases argon, krypton, and xenon will be discussed. Measurements were obtained down to 600 A with a photoelectric scanning technique using a helium continuum background at a bandwidth of 0.5 A. This bandwidth was sufficient to resolve the earlier members of the intense, diffuse, asymmetrical absorption line series originally found by Beutler between the 2P3/2 ground state and the 2P1/2 excited state of the ion. These measurements will be discussed and compared with other recent theoretical and experimental investigations. Finally, a compilation of references to papers on autoionization spectra arranged according to element and complete up to January 1964 is included. (Author)

AD-609 850 Div. 25
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TRANSIENT RESPONSE OF A RIGID SPHERICAL INCLUSION IN AN ELASTIC MEDIUM,
by C. C. Mow. Oct 64, 31p P-3001-1
AD 607 591, superseded

Unclassified report

Descriptors: (*Solids, Elasticity), (*Elasticity, Mechanical waves), (*Mechanical waves, Spheres), Potential theory, Motion, Harmonic analysis, Fourier analysis, Integrals, Bessel functions, Integral transforms, Complex variables, Numerical analysis, Boundary value problems.

The transient response of a rigid spherical inclusion of arbitrary density embedded in an elastic medium due to an incident pulse is examined. The Fourier-integral method is used, and an exact solution of the response is obtained. It is found that the acceleration and velocity of the inclusion are substantially different from those of the medium. A slight difference in the time history of the displacement between the inclusion and the medium is also noted. (Author)

AD-609 855 Div. 25, 13
OTS Prices: HC $3.00/MF $0.75

New Mexico Univ., Albuquerque. Engineering Experiment Station.
STUDY OF DISLOCATION FAILURE PHENOMENA IN UNIFORM RADIAL AND TENSILE FIELDS,
by F. D. Ju. 20 Aug 64, 75p ME-10
Grant AF AFOSR63 250
AFOSR 64 1715

Unclassified report

Descriptors: (*Fracture (Mechanics), Materials), (*Materials, Fracture (Mechanics), Loading (Mechanics), Mechanical engineering, Mathematical analysis, Boundary value problems, Stresses, Distribution, Elasticity, Strain (Mechanics), Sheets, Steel, Rings, Aluminum alloys, Heat treatment, Theory, Failure (Mechanics), Tensile properties, Metal plates.

In this report two states of plane elastic dislocation were studied. In one, dislocation patterns were the result of uniform radial stress fields. In another, the dislocation cuts appear in a uni-axial stress field. The uni-axial stress field yields a predetermined pattern of dislocation cuts. But the radial stress field produces dislocation patterns more or less of a random order. The model of the radial stress field problem is a large plate bounded at the interior by a circular hole. The model is subjected to a load that produces a uniform, radial tensile stress field with respect to the center of the hole, while the edge of the hole remains traction free. According to theoretical analysis and verified by experiments, the maximum shear occurs at the edge of the hole. Upon certain critical loads, the model yields by formation of Lueders bands. The purpose in this report is to study qualitatively the Lueders band pattern and to observe any regularity of its formation.

26. Production and Management

AD-609 514 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Martin Marietta Corp., Denver, Colo.
PRELIMINARY EVALUATION OF DIRECT-CURRENT MANUAL WELDING OF 2014-T6 ALUMINUM,
by R. Agricola. Feb 58, 17p WDD-M-MI-58-8
Contract AF04 645 56
Unclassified report

Descriptors: (*Aluminum alloys, Welding), (*Welding, Aluminum alloys), Welds, Direct current, Welding rods, Tensile properties, Hardness, Grain structures (Metallurgy), Degradation, Heat treatment, Tests, Sheets.

Roark Engineering d-c welding is only equal or inferior to Martin a-c welding; Direct-current filler-arc welding holds considerable promise over a-c welds because: The weld heat-affected zone decreases noticeably, using either 4043 or 5456 aluminum filler rods; Weld strengths are equal or superior under the same conditions; Using 5456 filler rod, a finer grained weld structure and higher initial weld hardness are achieved. (Higher hardness and finer grain structure could cause weld cracking problems.) (Author)

AD-609 517 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Martin Marietta Corp., Denver, Colo.
MANUAL 'FREE' WELDING OF 2014-T6 ALUMINUM.
by K. R. Agricola. Jul 57, 12p WDD-M-MI-57-53
Unclassified report

Descriptors: (*Aluminum alloys, Welding), (*Welding, Aluminum alloys), Maintenance, Welds, Tensile properties, Sheets, Stresses, Tests, Hardness, Degradation, Failure (Mechanics), Heat treatment.

Test results indicate that repair welding will increase the width of the heat-affected zone. The increased width results in lower design allowables for the welded joint than in straight welding. The average tensile strength of the repaired Set 1 specimens is higher than the original straight specimens. A probable explanation is that the severely induced stresses on the original specimens may have been reduced during repair welding. As in previous welding tests, the results are inconsistent. This is largely attributed to operator variables. (Author)

AD-609 518 Div. 26, 17, 27
OTS Prices: HC $2.00/MF $0.50

Martin Marietta Corp., Denver, Colo.
EVALUATION OF 6061-T6 TO 2014-T6 AND 6061-T6 TO 6061-T6 ALUMINUM ALLOY WELDS,
by R. Agricola. Dec 59, 26p WDD-M-MI-59-68
Unclassified report

Descriptors: (*Aluminum alloys, Welds), (*Welds, Aluminum alloys), Fuel tanks, Welding, Fracture (Mechanics), Tensile properties, Hardness, Microstructure, Stresses, Panels (Structural), Simulation, Thickness, Experimental data, Elasticity, Heat treatment, Metallography, Rocket motors (Liquid propellant).

This weld-evaluation program was conducted by simulating the cap-to-skirt weld junction, the cap-to-skirt T-weld junction, and the cap-to-outlet weld, and testing and examining these simulated welds for tensile tukon microhardness, and metallographic data. In addition special studies were made of welding under stress, mismatch of material thickness, and weld heat-affected zones. Confidence levels of 99.5%, 99.0%, and 95.0% for design application on fusion-, lap-, and T-welds are included. This report substantiates previous evidence that microcracks will not result from a 2014-T6 to 6061-T6 combination, provided the alloys are fusion- or T-welded and not lap-welded. This report also substantiates the fact that thickness mismatch in similar lap-welded metal junctions does not produce microcracks. Minimum ultimate tensile strength (UTS) data reveal that the use of thinner-than-anticipated dome material may be possible. Data on weld heat-affected zones prove that the heat-affected zone of 6061-T6 is greater than that of 2014-T6 and furnish the land widths necessary to restrict heat flow during welding of fusion and lap welds. (Author)

AD-609 647 Div. 26, 22, 31
OTS Prices: HC $1.00/MF $0.50

Naval Ammunition Depot, Crane, Ind.
THE DEVELOPMENT AND EVALUATION OF POLYSTYRENE FOAM CONTAINER FOR MK 66 TYPE SUBMARINE SIGNALS,
by Frank A. Niehaus. 15 Dec 64, 20p
NAD-CI RDTR49
Unclassified report

Descriptors: (*Styrene plastics, Expanded plastics), (*Smokes, Containers), (*Markers, Containers), (*Containers, Markers), (*Expanded plastics, Styrene plastics), Packaging, Drop testing, Tests, Vibration, Temperature, Humidity, Illumination, Signals, Submarines, Costs, Economics, Loading (Mechanics), Design.

An improved method for packaging the Mk 66, 67 and 68 Submarine Smoke and Illumination Signals and the Mk 28 Marine Location Marker has been developed and evaluated, as described in this report. The container is made of polystyrene foam, an economical and lightweight material, and will replace the present wood container. The polystyrene foam container will decrease the cost of packaging by more than sixty percent, in addition to permitting improved handling by an extensive reduction in container weight and cube. (Author)

AD-609 653 Div. 26, 17
OTS Prices: HC $5.00/MF $1.00

Republic Aviation Corp., Farmingdale, N. Y.
RESEARCH DEVELOPMENT AND TEST OF REFRACTORY METAL ALLOY FASTENERS.
Rept. for 25 Apr 61-15 May 64,
by C. J. Shaver. Oct 64, 152p
Contract AF33 616 8104, Proj. 1368, Task 136807
FDL TDR64 113
Unclassified report

Descriptors: (*Mechanical fasteners, Refractory metal alloys), (*Refractory metal alloys, Mechanical fasteners), Niobium alloys, Molybdenum alloys, Titanium alloys, Zirconium alloys, Carbon alloys, Antioxidants, Coatings, Manufacturing methods, Tensile properties, Shear stresses, Fastenings, Rivets, Screws, Bolts, Screw threads, Chromium, Titanium, Silicon.

The problem of producing and using standard fasteners (metallic) for use to 3000 F was investigated. The final production phase consisted of one molybdenum

alloy, TZM, and one columbium alloy, Cb752, with the threaded fasteners incorporating a special thread form. The Pfaudler PFR-6 coating was used on the molybdenum alloys while the Tapco Cr-Ti-Si coating was used on the columbium alloys. Final approved fastener configurations for both alloys included: common rivets (brazier head, Hi-shear rivets (flush head), flush head screws, hexagon head bolts, and nuts for use with the threaded fasteners. Blind fasteners were produced from columbium alloys only. Tensile and shear data are presented encompassing the temperature range -320 through 3000 F. Ambient and elevated temperature fatigue and joint test data are also presented. The program has shown that usable fastener configurations can be manufactured from molybdenum and columbium alloys, and that the resultant items can be successfully coated for satisfactory oxidation protection at nominal utilization temperatures. Extremely large reductions in load carrying capability at ambient temperatures were experienced in the molybdenum alloys after coating. This phenomenon was not as serious in the columbium alloys. (Author)

AD-609 671 Div. 26, 18
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
THE POTENTIAL OF CASTINGS IN FUTURE ARMY VEHICLES.
Monograph series,
by K. H. Abbott. 24 Jun 59, 16p
WAL MS4

Unclassified report

Presented to Materials Advisory Board, Panel on Castings and Powder Metallurgy, Wright Air Development Center, Dayton, Ohio.

Descriptors: (*Castings, Vehicles), (*Army equipment, Vehicles), (*Vehicles, Manufacturing methods), Production, Logistics, Military requirements, Quality control, Material forming, Metallography.

It appears that greater utilization of castings and powder metallurgy products by the Army is dependent upon a number of factors, some of which are general in nature, and some of which are peculiar to certain alloys. In general, the casting industry must take advantage of new techniques as they are developed, and must utilize production quality control in order to produce sound castings with maximum strength-weight ratios. Attempts should be made to cast to closer and closer dimension and weight tolerances in order to maximize this inherent process advantage. In ferrous castings, close control of the composition, particularly phosphorus, sulphur, nitrogen, oxygen, etc., will be prerequisite to the production of sound, high-strength castings, and close control of all other casting details will be necessary. For titanium (and perhaps for ferrous and other nonferrous alloys as well) vacuum melting and vacuum pouring is essential now, and will become commonplace if sound high-strength castings are to be produced in quantity. The inspection problems associated with castings are yet to be solved as far as satisfactory production inspection is concerned. However, much is being accomplished in this area, and it is anticipated that 5 - 10 years hence satisfactory nondestructive techniques will exist. (Author)

AD-609 677 Div. 26, 15
OTS Prices: HC $2.00/MF $0.50

Columbia Univ., New York. School of Engineering and Applied Science.
MARKOVIAN DECISION MODELS FOR REJECT ALLOWANCE PROBLEMS.
Technical rept. no. 24, Jul-Sep 64,
by Morton Klein. 1 Dec 64, 28p
Contract Nonr26655, Proj. NR042 099

Unclassified report

Descriptors: (*Linear programming, Production control), (*Quality control, Mathematical models), (*Mathematical models, Statistical processes), (*Decision theory, Quality control), Industrial production control, Stochastic processes, Dynamic programming, Probability, Optimization, Economics.

Most manufacturing processes produce some defective items. To compensate for this, the total quantity produced in attempting to satisfy an order is larger than the order size. The excess is called a reject allowance. In this paper it is shown how the Markovian decision framework can be used to determine the amount to produce when production is, or can be, divided so that the products can be inspected before the production run is ended. (Author)

AD-609 691 Div. 26, 4, 17
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
THE ELECTRODEPOSITION OF CHROMIUM ALLOYS. A LITERATURE REVIEW.
Monograph series,
by Charles Levy. Jan 60, 18p
WAL MS14

Unclassified report

Descriptors: (*Electrodeposition, Chromium alloys), (*Chromium alloys, Electrodeposition), Nickel alloys, Iron alloys, Cobalt alloys, Tungsten alloys, Molybdenum alloys, Coatings, Corrosion inhibition, Inorganic acids, Solutions.

Methods for electrodeposition of chromium-base alloys have been reported in the periodical and patent literature. Sixty-seven references are reviewed. The principal alloying elements include iron, nickel, cobalt, tungsten, and molybdenum. Ternary alloys have also been reported. Although no outstanding advances have been made to date, it is anticipated that further research in this field will yield plating methods which are both practical and economical. (Author)

AD-609 694 Div. 26, 30
OTS Prices: HC $2.00/MF $0.50

Watertown Arsenal Labs., Mass.
QUALITY CONTROL BY NONDESTRUCTIVE TESTING METHODS.
Monograph series,
by E. Rodgers. 14 Mar 60, 28p
WAL MS16

Unclassified report

Presented at American Welding Society Conference, Bostonian Hotel.

Descriptors: (*Quality control, Non-destructive testing), (*Non-destructive testing, Test methods), Reliability, Radiography, Ultrasonic radiation, Electromagnetic waves, Steel, Processing, Reviews.

Several types of non-destructive test methods are explained.

AD-609 867 Div. 26
OTS Prices: HC $1.00/MF $0.50

Hexcel Products, Inc., Berkeley, Calif.
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
Monthly progress rept. no. 6 for Jun 64,
by E. C. Vicars. 6 Aug 64, 17p
Contract DA04 200AMC477A

Unclassified report

See also AD-602 815.

Descriptors: (*Honeycomb cores, Aluminum alloys), (*Containers, Sandwich construction), (*Aluminum alloys, Honeycomb cores), Cylindrical bodies, Design, Energy, Drop testing, Vibration, Tests, Performance (Engineering), Thickness, Sheets, Deceleration, Acceleration.

AD-609 868 Div. 26
OTS Prices: HC $1.00/MF $0.50

Hexcel Products, Inc., Berkeley, Calif.
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
Monthly progress rept. no 8 for Aug 64,
by E. C. Vicars. 24 Sep 64, 21p
Contract DA04 200AMC477A

Unclassified report

See also AD-609 871.

Descriptors: (*Honeycomb cores, Aluminum alloys), (*Aluminum alloys, Honeycomb cores), (*Containers, Sandwich construction), Design, Cylindrical bodies, Drop testing, Hydrostatic pressure, Tests, Bonding, Energy, Absorption, Temperature, Shock resistance, Vibration, Acceleration, Deceleration, Performance (Engineering), Seals (Stoppers).

AD-609 871 Div. 26
OTS Prices: HC $1.00/MF $0.50

Hexcel Products, Inc., Berkeley, Calif.
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
Monthly progress rept. no 7 Jul 64,
by E. C. Vicars. 26 Aug 64, 14p
Contract DA04 200AMC477A

Unclassified report

See also AD-609 867.

Descriptors: (*Honeycomb cores, Aluminum alloys), (*Aluminum alloys, Honeycomb cores), (*Containers, Sandwich construction), Tests, Vibration, Steel, Acceleration, Design, Hydrostatic pressure, Performance (Engineering), Energy, Absorption, Bonding, Plastics, Seals (Stoppers), Cellulose acetates, Cylindrical bodies.

27. Propulsion Systems

AD-609 492 Div. 27, 30
OTS Prices: HC $4.00/MF $1.00

Astrosystems International, Inc., Fairfield, N. J.
MONITORING OF ROCKET ENGINE PERFORMANCE BY SPECTROSCOPIC TECHNIQUES.
Technical rept. for 10 Apr-10 Aug 64,
by Robert F. Strauss. Oct 64, 148p
Astrosys-TR-64001F
Contract AF33 615 1614, Proj. 8224, Task 822405
FDL TR64 163

Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Monitors), (*Spectroscopy, Rocket motors (Liquid propellant)), (*Performance (Engineering), Rocket motors (Liquid propellant)), Exhaust gases, Liquid rocket propellants, Oxygen, Hydrogen, Dimethyl hydrazine (1-1), Feasibility studies, Test equipment.

An analytical investigation was conducted to study the emission spectra of the exhaust stream of selected rocket engine liquid propellant combinations to determine the feasibility of detecting exhaust specie spectra as a measure of various propulsion system characteristics. The propellants selected for analysis were oxygen/hydrogen, oxygen/RP-1 and nitrogen tetroxide/unsymmetrical dimethylhydrazine as being most representative. A rocket engine for test was designed having a chamber pressure of 50-100 psia and a flow rate of 0.1 gm/sec. Calculations of signal strength with mixture ratio were made and the species OH, NH, CO and NO found to be of most interest. It was determined that mixture ratio variations and flow rate variations could be separately detected. A system for detecting incipient burnout by monitoring metallic oxide emissions and instability by intensity frequency pattern variations was presented. A flight weight system was shown to be feasible. (Author)

AD-609 513 Div. 27
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
THE EFFECT OF PROPELLANT ENERGY AND MASS DISTRIBUTION ON ROCKET PROPULSION EFFICIENCY.
by Howard S. Seifert. 5 Jan 57, 16p GM-TR-131
Contract AF18 600 1190

Unclassified report

Descriptors: (*Rocket propulsion, Effectiveness), (*Propellant burn-out, Energy), (*Exhaust gases, Velocity), Transport properties, Gravity, Rocket propellants, Payload, Numerical analysis.

The effect of varying the exhaust gas velocity of a rocket so that the exhaust gases possess little or no kinetic energy in an earth observer's frame of reference is examined. Under certain boundary conditions an improvement in terminal velocity of 10 to 20% is obtained relative to a rocket with fixed exhaust velocity. Given a fixed budget of energy per unit payload mass, the optimum mass of working fluid into which to distribute this energy (for maximum burnout speed) is calculated as a function of gravitational field strength. (Author)

AD-609 607 Div. 27, 14
OTS Prices: HC $1.00/MF $0.50

Atlantic Research Corp., Alexandria, Va.
CASTABLE CARBON FOR NOZZLE APPLICATIONS.
Quarterly progress rept. no. 3, 1 Sep-1 Dec 64,
by James D. Batchelor. Dec 64, 19p
Contract AF04 611 9718, Proj. 3059
RPL TR64 183

Unclassified report

See also AD-602 199.

Descriptors: (*Rocket motor nozzles, Carbon), (*Carbon, Rocket motor nozzles), Nozzle inserts, Casting, Erosion, Impregnation, Binders, Furfuryl alcohols, Thermal properties.

The first sub-scale nozzle (for the 5,000 pound thrust motor) was motor tested. This nozzle indicated excellent performance for the expansion cone, the insert back-up piece, and entrance back-up piece of castable carbon. The expansion cone erosion rate ranged from about 0.8 to 1.2 mils/sec; this performance was reported to be superior to any other cone tested in the 5,000 pound thrust motor. Substantial erosion occurred, however, on the castable carbon entrance section. Design and material improvements are being sought especially for this area.

AD-609 628 Div. 27, 9
OTS Prices: HC $5.00/MF $1.00

Aerojet-General Corp., Sacramento, Calif.
HYDROSTATIC BEARING FEASIBILITY PROGRAM.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 64,
1 Dec 64, 164p AGC-7439-Q-1
Contract AF04 611 7439, Task 30205

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Turbopumps, Bearings), (*Journal bearings, Turbopumps), (*Thrust bearings, Turbopumps), Liquids, Lubricants, Fluid flow, Laminar flow, Turbulence, Feasibility studies, Rocket motors (Liquid propellants), Fuel pumps, Design, Test equipment, Water, Oils, Tests, Theory, Programming (Computers), Mathematical analysis, Equations, Hydrostatics.

The objective of the Hydrostatic Bearing Feasibility Program is to establish the feasibility of liquid-lubricated hydrostatic journal and thrust bearings for large liquid rocket engine turbopumps. The four phases of the program are: Phase I--Analysis of the possible application of hydrostatic bearings to 800K- to 6000K-lb thrust liquid rocket engine turbopumps. Phase II--Design of bearings and tester. Phase III--Fabrication. Phase IV--Setup and testing with oil and water. The analysis and design work of the first two phases was completed on schedule and submitted to the Air Force for approval on 31 July 1964. This work was approved and formally issued on 14 October 1964. Pertinent portions of the Phase I and II report are included in this report as the appendix. During this reporting period emphasis was placed on the fabrication of the test bearings and the tester in accordance with Phase III of the planned program.

AD-609 728 Div. 27, 21
OTS Prices: HC $4.00/MF $1.00

Aerojet-General Nucleonics, San Ramos, Calif.
INDUCTIVE PLASMA ACCELERATION RESEARCH.
Final rept. for Jul 63-Jun 64,
by D. C. Gates, L. J. Demeter, W. B. Day, and J. L. Wyatt. Dec 64, 150p AN-1238

Contract AF33 657 10979, Proj. 3141, Task 314103
APL TDR64 97
Unclassified report

Descriptors: (*Plasma medium , Acceleration), (*Magnetohydrodynamics, Electric propulsion), (*Electric propulsion, Magnetohydrodynamics), (*Electrostatics, Magnetohydrodynamics), Ion sources, Ion accelerators, Transmission lines, Electromagnetic fields, Space charges, Inductance, Gas ionization, Ionic current, Measurement, Probes (Electromagnetic), Propulsion, Plasma physics, Instrumentation, Calibration, Plasma engines.

The purpose of this program is to evaluate the use of distributed charge exchange in a transmission-line type of inductive plasma accelerator. For this evaluation it is necessary to measure the flux and angular and energy distribution of the ions and neutrals that are accelerated and expelled from the transmission line. The emphasis of the program has been on the provision of a diagnostic system capable of rapidly performing the required measurements. The diagnostic system is in two main parts: the detector section (for use in study of the transmission line) and the calibration section. The design, construction, testing, and calibration of both the detector and the calibration section are described. (Author)

AD-609 743 Div. 27, 1, 14
OTS Prices: HC $1.00/MF $0.50

Naval Air Station, Pensacola, Fla. Materials Engineering Div.
TRECOM TECHNICAL REPORT 63-55; REVIEW OF.
Laboratory rept.,
by B. B. Bond. 14 Sep 64, 12p OA37-64
Unclassified report

Review of AD-428 108.

Descriptors: (*Aircraft engines, Failure (Mechanics)), (*Lubricants, Spectroscopy), (*Airplane engine oils, Spectroscopy), Test methods, Statistical analysis, Reviews.

The purpose of the report is to review TRECOM Technical Report 63-55 as it relates to the spectrometric oil analysis program being carried on by the Naval Air Station, Pensacola, to provide additional information, and to offer critical comment. (Author)

AD-609 746 Div. 27, 1, 14
OTS Prices: HC $1.00/MF $0.50

Naval Air Station, Pensacola, Fla. Materials, Engineering Div.
EFFECTIVENESS OF THE SPECTROMETRIC OIL ANALYSIS METHOD FOR MONITORING AIRCRAFT MECHANISMS.
Laboratory rept.,
by B. B. Bond. 26 Jun 64, 15p 0A20-64
Unclassified report

Descriptors: (*Aircraft equipment, Failure (Mechanics)), (*Aircraft engines, Failure (Mechanics)), (*Airplane engine oils, Spectroscopy), (*Lubricants, Spectroscopy), Internal combustion engines, Jet engines, Reliability, Test methods, Statistical analysis, Costs.

A summary is given of studies concerning the potentialities of the spectrometric oil analysis method for monitoring aircraft engines and other aircraft mechanisms.

AD-609 819 Div. 27, 22, 31, 30
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
MORRIS DAM PROPULSION LABORATORY.
Nov 64, 24p
NOTS TP3559
Unclassified report

Descriptors: (*Propulsion, Laboratories), (*Marine propulsion, Laboratories), (*Laboratories, Marine propulsion), Captive tests, Test facilities, Naval research laboratories, Engine and motors, Turbines, Propellants, Underwater ordnance, Instrumentation, Marine engineering.

The Morris Dam Propulsion Laboratory is located on a peninsula extending into a lake formed by Morris Dam on the San Gabriel river, about five miles north of Azusa, California. The location of this facility with relation to other NOTS range facilities is illustrated on a map. The laboratory is used in the fundamental studies, applied research, development, and testing of hydropropulsion systems and their components. Specially designed facilities are provided for tests on propellant systems, thrust and torque producing mechanisms, engines, turbines, and other associated equipment. An Underwater Cableway Facility is available for captive tests of torpedo systems. Each test area is provided with complete instrumentation capabilities to ensure maximum data acquisition.

AD-609 833 Div. 27, 12, 25
OTS Prices: HC $1.00/MF $0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
SPACE PROPULSION BY PLASMA ACCELERATION TECHNIQUES.
Technical information series,
by David B. Miller. Dec 64, 21p R64SD91
Unclassified report

Presented at University of Michigan, Ann Arbor, Michigan, 3-4 Dec 64, Symposium: 'New Research Frontiers in Physical Electronics.'

Descriptors: (*Plasma medium, Acceleration), (*Space propulsion, Electric propulsion), (*Electric propulsion, Plasma engines), (*Plasma engines, Space propulsion), Electrostatics, Electromagnetism, Magnetic fields, Orbital trajectories, Thrust, Particle accelerators, Electrodes, Equations, Hall effect, Electric engines.

Propulsion requirements for space missions necessitate high velocity propellant ejection in order that the total system weight not be dominated by the propellant load. Only the non-thermal, electric acceleration techniques, electrostatic and electromagnetic are realistically capable of meeting these high velocity requirements. Of these two basic classes, the electromagnetic, or plasma, accelerators show promise for ultimate, high thrust applications because of the high energy density capability of the magnetic field. The several plasma thrustor configurations, d-c, induction, pulsed and Hall-current, are considered in terms of basic features and experimental results. The comparative advantages of the pulsed and Hall-current geometries are shown by this survey. (Author)

AD-609 836 Div. 27, 12, 20
OTS Prices: HC $2.00/MF $0.50

Rocket Propulsion Lab., Air Force Systems Command, Edwards, Calif.

APPLICATION OF RADIOISOTOPE LIQUID LEVEL GAGES AT THE AIR FORCE ROCKET PROPULSION LABORATORY,
by Robert P. Couch. Jul 64, 37p
Proj. 675304005
RPL TDR64 123

Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Liquid level gages), (*Liquid level gages, Radioactive isotopes), Liquid rocket propellants, Cryogenics, Boiling, Radiation measurement systems, Effectiveness.

Extensive testing and application to test-stand operations has proven the radioisotope liquid level gage to be a versatile, inexpensive, and accurate method of point level gaging. The nuclear system has been proven accurate to ± 1/16 inch under simulated boiling cryogenic conditions and is recommended as a universal liquid level gage for all future liquid rockets which require accurate point level sensors. (Author)

28. Psychology and Human Engineering

AD-609 446 Div. 28
OTS Prices: HC $2.00/MF $0.50

Washington Univ., St. Louis, Mo.
STRUCTURAL FACTORS AND INDIVIDUAL NEEDS IN GROUP BEHAVIOR.
Annual rept.,
by Richard deCharms and Robert L. Hamblin.
Oct 64, 26p
Contract Nonr81611
Unclassified report

See also AD-265 329, -285 318, -413 361, -437 635, -438 513.

Descriptors: (*Group dynamics, Social psychology), (*Behavior, Motivation), Leadership, Programming (Computers), Wages, Fear, Leadership, Reaction (Psychology), Adjustment (Psychology).

STRUCTURAL FACTORS IN GROUP BEHAVIOR, by R. L. Hamblin: Computer programs were developed for analysis of psychophysical and social psychological data gathered with such measurement procedures as magnitude estimation; one program was designed for multiple correlation-multiple regression analysis of the relationship between one dependent variable and up to 50 independent variables. Socio-psychological experiments were made with college students from Brigham Young Univ., Provo, Utah, and then replications were made at the Naval Medical Research Inst., Bethesda, Md. Variables in the experiments such as status, utility, reinforcement, confidence, and moral attitude had a direct bearing on aggressive patterns in groups full of conflict and also on facilitative patterns. All the investigations were designed after the psychophysical model and utilized psychophysical methods. INDIVIDUAL NEEDS IN THE GROUP SITUATION, by R. deCharms. A study was made on schedules of leader contingency, perception, and productivity. With respect to achievement motivation and extrinsic versus intrinsic incentives, a preliminary study indicated that reversing the extrinsic incentive produces a large effect, that the effect is more evident in some subjects than others, and that the effect is related to the sex of the subject and to his level of fear of failure.

AD-609 456 Div. 28, 16
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
LATERALIZATION OF SOUNDS AT THE UNSTIMULATED EAR OPPOSITE TO A NOISE-ADAPTED EAR.
Technical rept. no. 24,
by Edward C. Carterette, Morton P. Friedman, William Lindner, and Jean Pierce. 1 Oct 64, 21p
Contract Nonr23358; Grant NSF G21722
Unclassified report

Descriptors: (*Auditory perception, Adaptation (Physiology)), (*Psychoacoustics, Adaptation (Physiology)), Psychophysiology, Hearing, Ear, Stimulation, Sound signals.

Some experiments aimed at clearing up disparate results in work on auditory adaptation led to the seeking out and discovery of conditions of monaural stimulation under which a sound image could be located toward the contralateral, unstimulated ear. The phenomenon helps to clarify divergent experimental results. A tentative model, with testable psychophysiological consequences, is outlined. (Author)

AD-609 457 Div. 28
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
THE DETECTION OF MARKOVIAN SEQUENCES OF SIGNALS.
Technical rept. no. 23,
by Morton P. Friedman and Edward C. Carterette.
15 Jul 64, 18p
Contract Nonr23358; Grant NsG237 62
Unclassified report

Descriptors: (*Psychoacoustics, Detection), (*Auditory perception, Probability), (*Psychometrics, Auditory perception), Psychophysiology, Auditory signals, Thresholds (Physiology), Learning, Conditioned reflex, Reaction (Psychology), Feedback, Signal-to-noise ratio, Performance (Human), Stimulation, Sequences, Performance tests.

The influence of constrained stimulus sequences on detection was studied in a two-alternative temporal forced-choice task with feedback. Three observers listened to a weak pure tone embedded in noise whose probabilities of occurrence and repetition in an interval were governed by a first-order Markov process. Each observer listened to examples of each of nine different Markov chains. Results were : (a) A single function relating detections to false alarms fitted individual sets of data well, in agreement with the theory of signal detectability, except (b) that detection was higher for more extreme repetition probabilities; (c) Responses depended strongly on the previous stimulus with (d) the dependence being peculiar to a given chain; (e) Detection probabilities increased during runs of signals in the same interval, yet (f) probability of detection on the first trial of a run in a given interval did not depend on the length of the preceding run in the other interval. (Author)

AD-609 486 Div. 28, 23
OTS Prices: HC $1.00/MF $0.50

Utah Univ., Salt Lake City.
INFORMATION AND SCIENTIFIC CREATIVITY,
by Calvin W. Taylor. Jun 64, 20p
Grant AF AFOSR144 63
AFOSR 64 2502
Unclassified report

Paper presented at the Second Symposium of the Federal Council for Science and Technology, 13 Apr 64, on the topic, 'Technical Information and the Federal Laboratory.'

Descriptors: (*Scientific personnel, Performance (Human)), (*Information retrieval, Scientific personnel), Human engineering, Supervisory personnel, Symposia, Intelligence tests, Learning, Memory, Reasoning, Industrial psychology.

In this paper the problem of studying what constitutes effectiveness and creativity in a scientist is discussed. The way the scientist receives and handles information, the intellectual climate in which he works, and the nature of the information received by him are all examined in their bearing on the creative process.

AD-609 508 Div. 28
OTS Prices: HC $2.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
THE EFFECTS OF GOAL DIFFICULTY ON PERFORMANCE: A FIELD EXPERIMENT,
by Andrew C. Stedry and Emanuel Kay. Nov 64,

30p ONR-RM-135
Contract NONR76024, Proj. NR047 048
Unclassified report

Descriptors: (*Performance (Human), Performance tests), (*Motivation, Performance (Human)), Perception (Psychology), Decision making, Psychometrics, Behavior, Theory, Analysis.

Perceptions of a goal in an area as challenging, easy, and impossible did not produce performance improvement in that order in the area; nor did performance in the other area follow the reverse order. Sample size was insufficient to test the greater effect to two difficult goals on production of impossible perceptions. Support was provided for the proposition that difficult goals perceived as impossible produced poorer performance improvement than goals perceived either as easy or challenging. Further analysis of the data revealed that, had the performance hypotheses been stated in the absence of perception -- i.e., difficult goals will produce either very good or very poor performance relative to normal goals -- confirmation would have been obtained. Futhermore, difficult goals in an area appeared to be associated with extremes in performance when the other area had a difficult goal, but this effect was not observed with a normal goal in the second area. Finally, although perceptions were not successful in predicting performance in one area, the combined performance in the two areas could be represented quite well as a linear function of the goal perceptions in the two areas. (Author)

AD-609 516 Div. 28, 15
OTS Prices: HC $4.00/MF $1.00

Washington Univ., Seattle.
PSYCHOLOGICAL MEASUREMENT AND PREDICTION. PART III, THE STRUCTURE OF TESTS,
by Paul Horst. Dec 64, 141p
Contract Nónr47733, Grant PHS-MH00743 08
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Psychometrics, Test construction (Psychology)), (*Test construction (Psychology), Psychometrics), Statistical functions, Statistical analysis, Matrix algebra, Variance.

Contents:
Characteristics of tests
Test item statistics
Test statistics as functions of item statistics
Maximum value test statistics
Effects of chance on test statistics
Test homogeneity.

AD-609 542 Div. 28, 23
OTS Prices: HC $1.00/MF $0.50

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
PERSONAL HISTORY CORRELATES OF MILITARY PERFORMANCE AT A LARGE ANTARCTIC STATION,
by E. K. Eric Gunderson, Paul D. Nelson, and James M. Orvick. Aug 63, 6p
Proj. MR005 12 2004, Task 1
NMNRU 64 22
Unclassified report

See also AD-432 145.

Descriptors: (*Military personnel, Sociometrics), (*Performance (Human), Military personnel), (*Psychometrics, Military personnel), Naval personnel, Polar regions, Naval shore establishments, Aging (Physiology), Social communications, Standards, Measurement, Military psychology, Confined environments, Adjustment (Psychology).

Relationships between biographical predictors and superiors' ratings were examined for two samples of Navy men who wintered-over at a large Antarctic base. Results for the large station personnel were very similar to those for Navy men studied earlier at smaller stations with respect to the favorability of an age-experience-rank cluster of variables and the unfavorability of past delinquency-truancy record. For a cluster of variables pertaining to needs for avocational activities, however, validity indicators tended in opposite directions for the two populations, low avocational activity being related to better adjustment at small stations. These findings demonstrated significant effects of environmental and organizational factors upon the validity of particular biographical predictors. (Author)

AD-609 543 Div. 28
OTS Prices: HC $1.00/MF $0.50

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
STRUCTURAL CHANGE IN SMALL ISOLATED GROUPS,
by Paul D. Nelson. Sep 64, 14p
Proj. MR005 12 2004, Task 1
NMNRU 64 24
Unclassified report

Presented at the Annual Meeting of the American Psychological Assoc., Los Angeles, Calif., Sep 64.

Descriptors: (*Confined environments, Group dynamics), (*Group dynamics, Confined environments), Adjustment (Psychology), Performance (Human), Behavior, Military personnel, Polar regions, Social communication, Sociometrics, Reaction (Psychology), Stress (Psychology), Military psychology, Sensory deprivation.

Men who had spent twelve months at one of three Antarctic research stations (N ranging from 17 to 33) provided information at two time periods concerning work, formal communication, and off-duty friendship interactions. The purpose of the study was to ascertain the extent to which group structure changed in any of these three domains of interaction over a six-month period. From an analysis of direct, indirect, and reciprocal choices there were no general change patterns common to all station groups or all types of interaction. (Author)

AD-609 544 Div. 28
OTS Prices: HC $1.00/MF $0.50

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
COMPATIBILITY AMONG WORK ASSOCIATES IN ISOLATED GROUPS,
by Paul D. Nelson. Nov 64, 13p
Proj. MR005 12 2004, Task 1
NMNRU 64 13
Unclassified report

Descriptors: (*Group dynamics, Confined environments), (*Adjustment (Psychology), Group dynamics), Social psychology, Polar regions, Sociometrics, Leadership, Behavior, Performance (Human), Social communication, Personality, Achievement tests, Attitudes, Military psychology, Analysis of variance.

In the present study an attempt was made to identify

correlates of work partner compatibility among 14 three- to sixman work groups located in isolated Antarctic stations. Using demographic and self-description data to construct group composition variables and sociometric data to derive compatibility criterion measures, work group homogeneity on age was significantly ($p < .01$) related to work group compatibility. An additional finding of significance ($p < .05$) was that a low level of compatibility existed among work associates who were equally high in their need to be interpersonally prominent as through leadership status. A general trend in the study was for group composition variables to be more related to compatibility during the winter than during the summer months, the time period of greatest confinement and isolation from the outside world. (Author)

AD-609 545 Div. 28
OTS Prices: HC $1.00/MF $0.50

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
VARIABILITY IN FACTOR STRUCTURES OF CLINICIANS' PERSONALITY RATINGS,
by E. K. Eric Gunderson and Edgar L. Kapfer.
Oct 64, 13p
Proj. MR005 12 2004, Task 1
NMNRU 64 23

Unclassified report

Descriptors: (*Factor analysis, Personality), (*Psychometrics, Standards), (*Personality, Psychometrics), Medical personnel, Military psychology, Projection techniques, Test construction (Psychology).

Personality ratings by military psychologists and psychiatrists who independently examined Navy and civilian volunteers for the U. S. Antarctic Research Program were factor analyzed by professional group and by individual. Factor patterns and trait meanings generally were found to be consistent among psychologists using a personality rating schedule which contained common trait adjectives and somewhat less consistent on another schedule which included specialized Rorschach terminology. Psychologists and psychiatrists as groups were very closely matched on two of three factors; the only notable difference between professional groups in interpretation of the traits utilized was on the Assertive item. Results were considered encouraging for those concerned with construction, standardization, and definition of personality concepts, but further study is needed of the correlates of idiosyncratic frames of reference. (Author)

AD-609 546 Div. 28
OTS Prices: HC $1.00/MF $0.50

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
PERFORMANCE EVALUATIONS OF ANTARCTIC VOLUNTEERS,
by E. K. Eric Gunderson. Aug 64, 9p
Proj. MR005 12 2004, Task 1
NMNRU 64 19

Unclassified report

Descriptors: (*Military psychology, Polar regions), (*Performance (Human), Naval personnel), (*Psychometrics, Naval personnel), Sociometrics, Leadership, Stress (Psychology), Behavior, Adjustment (Psychology), Personality.

Performance evaluations (Enlisted Performance Evaluation Marks) of applicants for Operation Deep Freeze were compared with those of other naval personnel, and volunteers with different amounts of experience were compared with each other. Performance ratings for Deep Freeze candidates were higher than those of other naval personnel of comparable experience. It was concluded that special standards or norms should be established to aid in selection of the best qualified men from this population and that separate norms are required for evaluating performance records of those experienced naval personnel. The Leadership trait may be more discriminating than other traits in this population. (Author)

AD-609 676 Div. 28, 15
OTS Prices: HC $1.00/MF $0.50

Queens Coll., Flushing, N. Y.
A LATENT STRUCTURE FOR THE SIMPLEX,
by W. A. Gibson. 1963, 15p
Grant Nonr G00033 63

Unclassified report

Descriptors: (*Psychometrics, Factor analysis), (*Correlation techniques, Matrix algebra), Linear programming, Transformations (Mathematics).

The purpose of the paper is to supply the simplex with an underlying or latent structure, in terms of which the simplex form may be integrated into the parsimonious psychological theory that includes factor analysis and the latent structure model of Lazarsfeld.

AD-609 698 Div. 28, 16, 30
OTS Prices: HC $1.00/MF $0.50

Coordinated Science Lab., Univ. of Illinois, Urbana.
DETECTION OF RATE CHANGES IN PERIODIC PHENOMENA,
by R. A. Avner. Oct 64, 17p CSL-R-235
Contract DA36 039AMC02208E; Grant NSF G23554,
Proj. 3A99 25 004

Unclassified report

Partly supported by the Office of Naval Research, Washington, D. C. and the Air Force Office of Scientific Research, Washington, D. C.
See also AD-600 554.

Descriptors: (*Learning, Time lag theory), (*Time-lag theory, Probability), (*Time-interval counters, Tests), Reaction (Psychology), Optimization, Statistical analysis, Programming (Computers).

The objective of this paper is to show with what probability differences between numbers of observed events within a pair of time intervals may be ascribed to specified changes in rate of a periodic phenomenon. In the example given above it might be required to say with what probability the observed difference of (25 - 10) = 15 events might be ascribed to an actual rate change of 0, 5, 10, 12, etc., events per interval. Such measures are valid for the class of phenomena, such as human heart rate, for which magnitude of rate change is relatively unrelated to base rate (Kaelbling, King, Achenbach, Branson, and Pasamanick (1960), Avner (1964)).

AD-609 713 Div. 28
OTS Prices: HC $4.00/MF $1.00

Pennsylvania Hospital, Philadelphia. Unit for Experimental Psychiatry.
PSYCHOLOGICAL CORRELATES OF PLATEAU

HYPNOTIZABILITY IN A SPECIAL VOLUNTEER SAMPLE.
Technical rept.,
by Ronald E. Shor, Martin T. Orne, and Donald N. O'Connell. Sep 64, 116p
Grant AF AFOSR88 63, Proj. 9779, Task 9779 01
AFOSR 64 2499

Unclassified report

Descriptors: (*Sleep, Psychology), (*Psychology, Sleep), Factor analysis, Test construction (Psychology), Tests, Illusions, Attitudes, Neuroses, Perception (Psychology), Psychometrics, Personality, Sex.

A number of specific hypotheses about correlates of hypnotizability were tested. A sample of 25 Ss representative of the investigators' special volunteer population was drawn. The criterion of hypnotizability used was the maximum hypnotic depth achieved in as many intensive hypnotic training sessions as the examiner needed in order to feel confident that a stable plateau in the S's performance had been reached. Findings confirmed the hypotheses that hypnotizability could be predicted from general propensity for unusual subjective hypnotic-like experiences, from attitudes and motivational factors specifically relating to hypnosis, and from postural sway, heat illusion, and vividness of mental imagery. In addition, with few exceptions the hypothesis was supported that there would be only negligible relationships between hypnotizability and measures of personality. Defining hypnotizability as a plateau performance rather than as some briefer estimate was shown to be wise. Results were placed into the perspective of the further lines of research needed. (Author)

AD-609 735 Div. 28
OTS Prices: HC $1.00/MF $0.50

Institute of Behavioral Research, Texas Christian Univ., Fort Worth.
DIMENSIONS OF STIMULUS SITUATIONS WHICH ACCOUNT FOR BEHAVIOR VARIANCE.
Quarterly status rept.,
by S. B. Sells. 1 Jan 64, 3p
Contract Nonr343600

Unclassified report

See also AD-602 369.

Descriptors: (*Behavior, Stimulation), (*Group dynamics, Behavior), Sociometrics, Psychometrics, Ecology, Factor analysis, Psychophysiology.

AD-609 807 Div. 28, 32
OTS Prices: HC $6.00/MF $1.25

Mental Health Research Inst. Univ. of Michigan, Ann Arbor.
STUDIES IN BEHAVIORAL ASPECTS OF GRAMMAR AND SEMANTICS.
Final rept.,
Oct 64, 208p
Contract AF30 602 3042, Proj. 4594, Task 459403
RADC TDR64 146 Unclassified report

Descriptors: (*Language, Verbal behavior), (*Information retrieval, Reading machines), (*Reading machines, Language), (*Psychology, Language), Word association, Behavior, Reading, Machine translation, Test construction (Psychology), Artificial intelligence, Data processing systems, Simulation, Human engineering, Mathematical logic.

Investigations were made of natural and simulated language behavior. The first concerned the question of how syntactic language behavior is related, if at all, to modern theories of grammar. In order to develop a mechanical syntactic analyzer to replace an ordinary literate reader of a text, it is necessary to understand how the latter comprehends a text. In other words, a syntactic analyzer should be modeled on principles similar to those used by a human reader. The second covered a number of approaches to the study of a 'semantic space.' These experiments are essentially word association experiments, in which the controls are stricter than free association experiments, but not as strict as in Osgood's semantic differential techniques. (Author)

AD-609 811 Div. 28, 6, 23
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570TH), Wright-Patterson AFB, Ohio.
TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY AND LEARNING.
Final rept.,
by Marvin Levine, John W. Senders, Ross L. Morgan, and Louise Doxtater. Nov 64, 20p
Proj. 1710
AMRL TR64 104

Unclassified report

Prepared in cooperation with Antioch Coll., Yellow Springs, Ohio, Contract AF18 600 50.

Descriptors: (*Performance tests, Tracking), (*Tracking, Performance (Human)), Learning, Training, Motor reactions, Display systems, Cathode ray tubes, Delay circuits, Analysis of variance.

Eighty subjects performed a one-dimensional compensatory tracking task for 55 one-minute trials. The subjects were divided into five separate groups and each group performed the task with a different exponential delay between the control input and the display, a dot of light on a cathode ray tube. The time constants for the exponential delays were 0.015 seconds, 0.150 seconds, 0.900 seconds, 2.100 seconds and 3.000 seconds respectively. The results indicate that time-on-target scores decrease with increasing delay. For delays greater than 0.150 seconds, the decrease is linear. There is a sharper decrease in performance from 0.015 seconds delay to 0.150 seconds delay than for other portions of the function. Increased practice changes the level, but not the shape, of the total function. The effects of delay and learning were within the same range, indicating that a given level of system performance often can be achieved either by altering the delay or by training the operator. However, performance is maximized if delay is reduced and the operator is trained. (Author)

29. Quartermaster Equipment and Supplies

AD-609 604 Div. 29, 5
OTS Prices: HC $1.00/MF $0.50

CBS Labs., Stamford, Conn.
PERSONNEL COMMUNICATIONS IN SPACE. A STUDY OF SPEECH TRANSMISSION AND HELMET COMFORT.
Rept. for Jul-30 Sep 64,
by Benjamin B. Bauer, Alfred L. DiMattia, and Allan J. Rosenheck. Dec 64, 18p CLD-1720
Contract AF33 657 10737, Proj. 4335, Task 433506
AL TDR64 175 S1

Unclassified report

Descriptors: (*Helmets, Communication equipment), (*Speech, Wave transmission), Space environmental conditions, Acoustic filters, Space medicine, Tolerances (Physiology), Aerospace craft, Air, Models (Simulations), Design, Noise.

The difficult environments encountered in aerospace vehicles impose severe demands upon personnel communication equipment. Described in the report is the development of two space helmets. Their features are summarized briefly. In addition, air supply systems were designed and constructed for the helmets.

AD-609 662 Div. 29, 14
OTS Prices: HC $0.50/MF $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.

INFLUENCE OF PRESSURE ON SLUDGING OF P-C-437 STEAM CLEANERS,
by T. R. Nichols. 19 Nov 64, 16p
Proj. IC024401A328
CCL 170

Unclassified report

Descriptors: (*Water softeners, Steam cleaning), (*Steam cleaning, Water softeners), Cleaning, Cleaning compounds, United States Government, Specifications, Test methods, High-pressure research, High-temperature research, Colloids, Optical analysis.

The purpose of this study was to determine whether or not the Federal Specification P-C-437, 21-24 lb. per sq. in. water softening test correlates with the practical steam pressures used in steam cleaning machines; and, if not, to develop a high pressure (temperature) water softening test for Federal Specification P-C-437. Water softening tests at elevated pressures of 82 - 87 lb. per sq. in. were carried out in the gasoline oxidation bomb of A.S.T.M. Method D525-55. It was found that the sludging occurring at high temperatures cannot be determined by optical density or turbidity measurements, apparently because of the non-uniformity of the size of the sludge particles or aggregates. Evaluation of high temperature tests was accomplished by adjusting the test solution hardness to produce opalescence which could be measured by optical density. The water softening tests at 82 - 87 lb per sq in. were found to correlate with those at 21 - 24 lb. per sq. in. in the Federal Specification P-C-437 test. In view of this correlation and the laborious nature of the 82 - 87 lb. per sq. in. test, it seems advisable to retain the present 21 - 24 lb. per sq. in. test in Federal Specification P-C-437. (Author)

30. Research and Research Equipment

AD-609 438 Div. 30, 8
OTS Prices: HC $0.50/MF $0.50

Army Materials Research Agency, Watertown, Mass.
ELECTROMAGNETIC TEST CONTROL REQUIREMENTS,
by Patrick C. McEleney and Rudolph V. Giangrande.
Sep 64, 23p
AMRA TR64 26

Unclassified report

Descriptors: (*Electromagnetic fields, Non-destructive testing), (*Non-destructive testing, Military requirements), Magnetic fields, Test methods, Control, History, Heating, Temperature control, Steel, Specifications.

Three areas which require control in electromagnetic nondestructive testing are identified. The magnetic field strength of the test, magnetic history of the part, and heating of the test standard can and have seriously affected results in magnetic testing in critical programs. Experiments conducted indicate how these factors influence test results, and techniques are recommended whereby adequate procedures can be established. (Author)

AD-609 450 Div. 30, 8
OTS Prices: HC $1.00/MF $0.50

Laboratory for Electroscience Research, New York Univ., N. Y.
RESEARCH INVESTIGATIONS IN SYSTEMS THEORY.
Final rept. for 1 Oct 63-30 Sep 64,
by J. K. Wolf and J. R. Ragazzini. 1 Oct 64, 20p
Grant AF AFOSR499 64
AFOSR 64 2176

Unclassified report

Continuation of Grant AF AFOSR62 321.
See also AD-602 685.

Descriptors: (*Control systems, Theory), (*Abstracts, Control systems), Communication theory, Control simulators, Computers, Digital systems, Model theory, Mathematical models, Adaptive control systems, Optimization, Tensor analysis, Operations research, Corrections, Programming (Computers), Special functions (Mathematical), Feedback amplifiers, Synthesis, Errors, Linear systems, Noise (Radio).

Contents:
A study of time-optimal controls for continuous and sampled data systems
The synthesis of approximately optimal control systems
The synthesis of multiple loop feedback amplifiers
Cumulative codes as variable redundancy codes
On an extended class of error-locating codes
On codes derivable from the tensor product of check matrices
The cost function and its minimization for a general class of self-adaptive systems
The minimization of measurement error in a general perturbation-correlation, process identification system
The utilization of external, correlated signals to reduce the self-adaptive cost function.

AD-609 469 Div. 30, 8
OTS Prices: HC $6.00/MF $1.25

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
CRYOELECTRIC RANDOM ACCESS MEMORY, PHASE II 10(9) BIT MEMORY.
Final rept. for 1 Mar 63-1 Mar 64,
by L. L. Burns, D. Boswick, D. A. Christiansen, L. S. Cosentino, and J. Fejer. Nov 64, 262p
Contract AF30 602 3090, Proj. 5581, Task 558108
RADC TDR64 376

Unclassified report

See also AD-422 950.

Descriptors: (*Cryogenic storage devices, Manufacturing methods), (*Computer storage devices, Digital computers), Cryogenics, Electrical networks, Thermodynamics, Theory, Computer logic, Thin films (Storage devices), Superconductors.

This report covers the work performed under Phase II of a contemplated three-phase program to develop the theory and technology necessary for the manufacture of billion-bit cryoelectric memories. Further advances in the theoretical understanding of memory operation have clearly delineated the requirements of the fabrication effort. Tests of the many samples made during the year have established that the matching of memory planes with the necessary cryotron trees is practical. Phase II closed with the successful testing of a 128 by 128 memory plane containing 16,384 cells and 508 cryotrons in the trees. Only a problem with unexpectedly low sense signals from the center portion of the plane prevented the stacking of a group of these planes. Improved high-speed evaporation plants have greatly increased the yield of experimental samples and improved their quality. Continued advances in mask fabrication techniques have provided methods that are suitable for the finer patterns required for 512 by 512 and 1024 by 1024 planes. Related work on high-speed selection trees employing cryotrons is reported. It is shown that cryotrons are suitable for this application but further work is necessary to reduce the heat dissipation. (Author)

AD-609 487 Div. 30
OTS Prices: HC $1.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
TECHNIQUES FOR AUTOMATING THE CONSTRUCTION OF TRANSLATORS FOR PROGRAMMING LANGUAGES,
by W. H. Wattenburg. 13 Jan 64, 20p ERL-64-45
Grants AF AFOSR139 63, AF AFOSR139 64

Unclassified report

Descriptors: (*Programming languages, Compilers), (*Compilers, Programming languages), Programming (Computers), Automation, Mathematical analysis, Automation.

Formal procedures are summarized for constructing translators whereby a computer is used to generate substantial portions of the translators, the latter being termed symbolic machine language assemblers, macro expanders, or compilers. The translators all perform the task of translating programs written in one language into equivalent programs written in another. BASIC BOOTSTRAP PROCEDURE: The first translators were written in an available machine language and were mostly symbolic machine language translators (assemblers). Application of the 'bootstrap' procedure was the writing in symbolic language, including the translator itself, of programs, once a symbolic machine language translator became available for a particular machine. The bootstrap procedure has the property that each translator can translate its own description into itself since it is described by a language which is a subset of the language it translates. The NELIAC,

compiler for the Remington Rand M460 is a 'self-compiling compiler'. MULTIPLE BOOTSTRAP PROCEDURES: These procedures involve translators producing object programs for machines other than the machine that performed the translation. As an example of the use of an intermediate language and multiple bootstrap procedure, there is cited the translator constructed for the FORTRAN language and the IBM-7090 and CDC-3600 computers by Mendicino, Storch, and Sutherland at the Lawrence Radiation Lab. of the University of California.

AD-609 488 Div. 30
OTS Prices: HC $3.00/MF $0.75

Wolf Research and Development Corp., West Concord, Mass.
THE ATTRIBUTE DERIVATION AND DISPLAY SYSTEM FOR THE EXPERIMENTAL DYNAMIC PROCESSOR.
Final rept.,
by Jerome Cohn, Richard Gagan, Robert Keim, and Marilyn Wisowaty. 30 Sep 64, 71p
Contract AF19 628 1614, Proj. 4648, Task 464805
AFCRL 64 890

Unclassified report

Continuation of Contract AF19 604 6629.

Descriptors: (*Computers, Programming (Computers)), (*Programming (Computers), Numerical methods and procedures), (*Numerical methods and procedures, Programming (Computers)), (*Display systems, Computers), Vector analysis, Matrix algebra, Statistical analysis, Data processing systems, Control sequences.

A new version of the Attribute Extraction program for the Experimental Dynamic Processor is described. This new version takes advantage of the drum storage and display capability of the DIGIGRAPHIC equipment that has been added to the DX-1. The several display programs and the Attribute program have been compatible and work under a common executive routine, the DEXTER system. The order of solvable matrices has been increased from 50 to 160. Some preliminary results are given. The special display programs are described. The Power Method to find eigenvalues and eigenvectors of large matrices is described. A simulation of a proposed optical eigenvalue and eigenvector processor is described. (Author)

AD-609 500 Div. 30, 5
OTS Prices: HC $2.00/MF $0.50

Mitre Corp., Bedford, Mass.
THE ROLE OF SIMULATION AND DATA REDUCTION PROGRAMS IN THE DEVELOPMENT OF REAL-TIME SYSTEMS.
by Edward L. Lafferty. Dec 64, 31p Mitre SR-125
Contract AF19 628 2390, Proj. 416.1
ESD TDR64 169

Unclassified report

Descriptors: (*Command and control systems, Air defense command), (*Models (Simulations), Command and control systems), (*Data processing systems, Command and control systems), (*Programming (Computers), Command and control systems), Digital computers, Real time, Monte Carlo method, Systems engineering, Ground support equipment, Communication systems, Air Force, Simulation.

This report deals with the valuable use of simulation and data reduction computer programs in the acquisition and engineering of command and control systems. The value of simulations, especially in facilitating the learning process and in expediting system design, is described. Data reduction is shown to be an evolutionary process and the design of a data reduction system should be considered in the very early stages of system acquisition. Some model simulation and data reduction system software are examined and several considerations in their design are enumerated. The importance of the system engineer's recognition of the constantly changing nature of all his instrumentation is stressed as being all-important in the design of support systems which provide an overall effectiveness. (Author)

AD-609 535 Div. 30, 2, 4, 5, 14, 17, 20, 25, 31
OTS Prices: HC $1.25/MF $0.75

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Nov 64, 56p
PB 181 568

Unclassified report

Descriptors: (*Naval research, Reports), (*Ultraviolet optical materials, Polarization), (*Steel, Radiation damage), Atmosphere, Chemistry, Corrosion, Mechanics, Metallurgy, Ceramic materials, Nuclear physics, Atoms, Optics, Radio equipment, Solid state physics, Sound, Scientific research.

Complete papers: Polarizers for the extreme ultraviolet; and Neutron embrittlement of reactor pressure vessel steels. Summaries are given of research in the following fields: atmosphere and astrophysics, chemistry, mechanics, metallurgy and ceramics, nuclear and atomic physics, optics, radio, solid-state physics, and sound.

AD-609 564 Div. 30, 4, 9, 12, 14, 25
OTS Prices: HC $1.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
PROFESSIONAL PAPERS CLEARED FOR POSSIBLE PUBLICATION AND/OR PRESENTATION.
Rept. for 1 Sep-15 Oct 64,
by Frances A. Brady. 30 Oct 64, 6p
CSR-469(9990)PP-4
Contract AF04 695 469

Unclassified report

Descriptors: (*Scientific research, Bibliographies), (*Bibliographies, Scientific research), Reports, Indexes, Chemistry, Physics, Atmosphere entry, Spacecraft, Materials.

AD-609 570 Div. 30
OTS Prices: HC $3.00/MF $0.75

Systems Research Center, Case Inst. of Tech., Cleveland, Ohio.
A HEURISTIC APPROACH TO SOLUTION OF CHECKERBOARD PUZZLES,
by Gilbert J. Hansen. 1964, 95p SRC-49-A-64-16
Grants AF AFOSR125 63 and NSF GP642
AFOSR 64 2406

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Game theory, Programming(Computers)), (*Programming (Computers), Game theory), (*Bionics, Pattern recognition), Combinatorial analysis, Digital

computers, Programming languages, Optimization, Simulation, Artificial intelligence.

The problem of reconstructing a checkerboard cut into a number of straight edge pieces was solved by a digital computer program employing a varity of heuristics. The major heuristics used were considerations of the symmetry of the pieces, correct color combinations, optimal selection of the place on the board to fit the next piece, the optimal piece to select at each stage in fitting the puzzle together, pairing of the pieces, and selecting the first piece to be used in starting the puzzle. These heuristics were applied in order to simulate as closely as possible the way in which a human being would proceed in obtaining a solution. These enabled us to minimize the number of tries necessary to obtain a solution, thus making the solution time reasonable. Two 8x8 checkerboard puzzles were tried. The first consisted of 12 pieces and was solved in 8 minutes. The second had 13 pieces and took 1 hour and 25 minutes. The recursive program was written in IPL-V and run on the Univac 1107 computer. (Author)

AD-609 580 Div. 30, 5, 8, 12, 25
OTS Prices: HC $3.00/MF $0.75

Aerospace Technology Div., Library of Congress, Washington, D. C.
FOREIGN SCIENCE BULLETIN, 1965, VOL. 1, NO. 1.
Jan 65, 60p
TT 65 60477

Unclassified report

A monthly review of selected foreign scientific and technical literature sponsored by the Advanced Research Projects Agency, Department of Defense.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Scientific research, Reviews), Periodicals, Government (Foreign), Telemeter systems, Electron beams, Pumping (Electronics), Lasers, Wave transmission, Pattern recognition, Photosynthesis, Solvent extraction, Piezoelectric crystals, Semiconductor devices, Digital computers, Heat-resistant plastics, Lunar trajectories, Water supplies, Mass-energy relation, Photography, Fluid mechanics.

This publication is designed to reflect what appear to be some of the major trends in foreign scientific research and development activities, as well as to supply specific information on topics of known interest to the U. S. scientific and engineering community. The publication will be based on material obtained from original sources, about 1000 of which are reviewed monthly by subject specialists. Emphasis will be placed on scientific developments in the Soviet Union and in Communist China, since scientific literature originating in these countries is not readily available to the U. S. reader. Where appropriate, comments will be given and comparisons will be made with research being conducted in the West.

AD-609 581 Div. 30, 15
OTS Prices: HC $4.00/MF $0.75

California Univ., Berkeley.
ALGEBRAIC THEORY OF MACHINES. I. THE MAIN DECOMPOSITION THEOREM. PRIME DECOMPOSITION THEOREM FOR FINITE SEMIGROUPS.
Technical rept. no. 63-1,
by Kenneth B. Krohn and John L. Rhodes. Sep 63, 104p
Contract Nonr22280, Proj. NR044 249

Unclassified report

Descriptors: (*Algebra, Automata), (*Groups (Mathematics), Mapping (Transformations)), Theorems, Set theory, Combinatorial analysis, Mathematical logic, Sequences, Computers.

AD-609 620 Div. 30, 8, 32
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
A 'COMPLETE IDIOT WITH SPECIAL TALENT' FOR THE TROOPS.
6 May 64, 8p
RSIC 178; TT 64 15688

Unclassified report

Trans. from Badische Zeitung (West Germany) 1964, 28 Mar.

Descriptors: (*West Germany, Armed Forces (Foreign)), (*Armed Forces (Foreign), West Germany), (*Machine translation, West Germany), Digital computers, Data processing systems, Dictionaries, Computers.

The activities of the Translation Service of the Western German Armed Forces in Mannheim are described. About 10% of the translations are from military texts; about 80% are of specialized scientific and technical literature; and the remainder are of correspondence between the governing bodies of NATO and WEU. The Service has 6 working groups that are divided according to technical specialty. It has a nucleus, the terminology group, that has collected concepts for use in translation since 1961, in cooperation with terminology committees. The data processing machine can print out 300,000 concepts and 15,000 abbreviations in German for their English equivalents. Plans are afoot for using a digital computer to attain 'half-automatic translation.' The computer is called a 'complete idiot with a special ability for carrying out orders.'

AD-609 637 Div. 30
OTS Prices: HC $1.00/MF $0.50

Rome Air Development Center, Griffiss AFB, N. Y.
CONCEPTS RELATIVE TO SYSTEM EFFECTIVENESS,
by Julius Widrewitz. Jun 64, 24p EME-TM-64-4
Proj. 5519

Unclassified report

Descriptors: (*Systems engineering, Mathematical models), Operations research, Theory, Mathematical analysis.

This memorandum presents a definition of and mathematical model for measurement of System Effectiveness. Improvements over existing definitions of system effectiveness are incorporated in the model. (Author)

AD-609 646 Div. 30, 18
OTS Prices: HC $1.00/MF $0.50

Office of Naval Research, Washington, D. C.
ONR POLICY ON RESEARCH,
by Robert W. Morse. Oct 64, 13p
ONR 18

Unclassified report

Descriptors: (*Naval research, Research program administration), (*Research program administration, Naval research), Navy, Management planning, Naval research laboratories, Patents, Naval training, Naval personnel, Scientific personnel.

The principles are stated which guide the Office of Naval Research in the pursuit of its assigned mission and in the development of a balanced, coherent research program. The duties of the Office of Naval Research are: (1) the exercise of intellectual leadership by encouragement and coordination of naval research; (2) the conduct of naval research; and (3) the stewardship of the Navy's concern in matters of patents, inventions, and copyrights. This statement is intended to provide a checkpoint in time and give perspective to those changes which will inevitably occur in the future.

AD-609 681 Div. 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
APPLICATIONS OF A DIGITAL-COMPUTER SIMULATION OF A NEURAL NETWORK,
by Donald H. Perkel. 31 Dec 64, 28p P-3036
Grant NIH GM09608 03

Unclassified report

Presented at the Cybernetic Sciences Symposium. (2nd). The Los Angeles Invitational on Biophysics, at the University of Southern California, 13 Oct 64. Sponsored by ONR.

Descriptors: (*Cybernetics, Symposia), (*Nervous system, Models (Simulations)), (*Digital computers, Simulation), Central nervous system, Peripheral nervous system, Nerve cells, Analog systems, Programming (Computers), Programming languages, Nerve impulses, Sampling, Spikes, Probability, Motion pictures.

The neuron model described was developed as an adjunct to experimental neurophysiological investigations. The model and its applications share a biological emphasis with the analog models of Harmon and Lewis and the digital-computer simulations of Farley, as distinguished from the emphasis on 'bionics' applications in the Perceptron.

AD-609 720 Div. 30
OTS Prices: HC $7.00/MF $1.75

TRW Space Technology Labs., Redondo Beach, Calif.
THE TRW TWO-STATION, ON-LINE SCIENTIFIC COMPUTER,
Annual progress rept. (final) for 14 Jul 63-14 Jul 64,
by G. J. Culler, B. D. Fried, E. C. Field, and D. Pope.
Dec 64, 326p STL-8587-6002-RU-000
Contract AF30 602 3097, Proj. 4594
RADC TDR64 393

Unclassified report

Descriptors: (*Computers, Data processing systems), (*Data processing systems, Command and control systems), (*Command and control systems, Data processing systems), Scientific research, Plasma oscillations, Equations, Mathematical analysis, Programming (Computers), Control sequences, Real time, Instruction manuals, Systems engineering.

This report describes the research and development of on-line techniques and their application to problem solving. For convenience, it is organized in several parts. Part 1 lists the published papers describing research problems solved in the course of this effort and summarizes the computational aspects of the multi-dimensional problem (a nonlinear diffusion equation) which received the most attention; the physical significance of this problem and a discussion of the results obtained is given in part 5. Part 2 contains a general description of the on-line system from the user's viewpoint, including some elementary examples of the 'constructive' aspects of on-line computing. In part 3 we have collected the on-line problem solving techniques developed in this program which are of general interest. These involve a blending of numerical and mathematical analysis somewhat different from that generally encountered in conventional computing, being best characterized as emphasizing a global rather than a local approach to problem formulation and solution. Part 4 constitutes a complete user's manual for the present system. It gives a detailed description of each of the basic programs. A general understanding of the on-line system can be obtained from part 2; parts 3 and 4 provide the detailed information needed to actually use this system. (Author)

AD-609 733 Div. 30, 15
OTS Prices: HC $1.50/MF $0.75

Harry Diamond Labs., Washington, D. C.
ANALOG COMPUTER TECHNIQUES FOR PROBLEMS IN COMPLEX VARIABLES,
by Arthur Hausner. 30 Sep 64, 59p
Proj. 39833
HDL TR1250

Unclassified report

Descriptors: (*Analog computers, Complex variables), (*Complex variables, Analog computers), (*Amplifiers, Programming (Computers)), Numerical methods and procedures, Conformal mapping, Complex numbers, Real variables, Real numbers, Polynomials, Integration, Oscillators, Circuits, Calculus of variations, Search theory.

By programming pairs of amplifiers to represent the real and imaginary parts of complex variables on an analog computer, techniques are developed which (1) permit the mechanization of the method of steepest descents, for finding roots of complex functions, in Cartesian coordinates; (2) simplify the generation of square-root and division circuits; (3) allow the generation of complex functions utilizing the Cauchy integral theorem; and (4) enable a programmer to scan the z-plane efficiently when electronic mode control and track-and-hold circuitry are available. The report is documented with examples which show that these techniques frequently provide more efficient programs, in terms of equipment, than current methods. (Author)

AD-609 749 Div. 30, 28
OTS Prices: HC $2.00/MF $0.50

Engineering Projects Lab., Mass. Inst. of Tech., Cambridge.
HUMAN USE OF SHORT TERM MEMORY IN PROCESSING INFORMATION ON A CONSOLE,
by Bernard P. Zeigler and Thomas B. Sheridan.
Sep 64, 49p DSR-9960-1
Contract AF19 628 3317, Proj. 7682, Task 768204
ESD TDR64 620

Unclassified report

Descriptors: (*Computer personnel, Memory), (*Computer storage devices, Human engineering), Decision making, Computers, Information retrieval, Data processing systems, Data storage systems, Communication theory, Learning.

The report assumes that an operator's console constitutes a third form of memory in addition to that integral to the human and that integral to the machine which is not directly accessible to the human. Questions are raised concerning the characteristic modes of human storage and retrieval of information from internal memory when such

external memory is accessible. The report also introduces the concept of associative memory nets formed by cue-related images of external events. A list processing experiment is described. Storage structures characterizing internal human memory and external console memory in this task are postulated. A retrieval model implied by these sturctures is constructed to account for the effects of computation and learning upon the features of the experimentally obtained curves. Insufficient retrieval of required information from internal memory is assumed to necessitate external memory search. The effect of computation is to increase the probability of insufficient retrieval and hence the frequency of external search. Learning decreases this probability. The effects of inducing alternate forms of internal storage are studied and found generally to result in increased storage and retrieval times. Implications for console design are discussed. (Author)

AD-609 775 Div. 30, 4
OTS Prices: HC $3.00/MF $0.50

Illinois Univ., Urbana.
A SHOCK TUBE WITH QUADRUPOLE MASS FILTER FOR MONITORING HIGH-TEMPERATURE REACTION KINETICS.
Research rept. no. 1,
by David Gutman, Arthur J. Hay, and R. L. Belford.
Sep 64, 51p
Grants AF AFOSR62 245, AF AFOSR588 64
AFOSR 64 2410

Unclassified report

Descriptors: (*Reaction kinetics, Monitors), (*Shock tubes, Reaction kinetics), Argon, Nitrogen, Nitrogen compounds, Oxides, High-temperature research, Electron multipliers, Ion sources, Ionic current, Time, Graphics, Gas analysis, Mass spectroscopy, Spectrum analyzers, Test equipment, Design, Recombination reactions, Vacuum apparatus, Shock waves.

During the first two-year term of this grant and the first months of the second two-year term all the equipment necessary to study fast chemical reactions with a shock tube and mass spectrometer were built. All the separate components were assembled, tested and in most cases modified to improve performance. Preliminary test results were obtained in the form of ion current-vs.-time curves for shocked pure argon and for dilute N2 in Ar. A preliminary test of the N20 dissociation reaction was performed. Several new ideas in shock tube instrumentation were developed and are discussed. A general description of the shock tube, mass spectrometer and all the supporting equipment is included. The shock studies in the nonreacting systems were conducted to calibrate the system and also to determine the limits of sensitivity and range of applicability of this method of studying reactions. Some of the early results are discussed.

AD-609 784 Div. 30, 8, 16
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE ELECTRONIC INTERLOCUTOR - AND THE MACHINE SAID IN RESPONSE,
by E. Saparina. 1 Dec 64, 26p
FTD TT64 71; TT 65 60584

Unclassified report

Unedited rough draft trans. of Znanie-Sila (USSR) 1962, v. 37, no. 10, p. 29-32.

Descriptors: (*Speech recognition, Computers), (*Artificial intelligence, Speech recognition), Automatic, Pattern recognition, Cybernetics, Neurology, Communication theory, Speech, Cerebral cortex, Nervous system, Speech representation, Hearing, Verbal behavior, USSR.

This article is an assembly of remarks on the aspects of speech and its recognition and the brain processes concerned with such phenomena. ELECTRONIC INTERLOCUTOR: Laboratories of experimental phonetics in the USSR in Moscow, Leningrad, and Tbilisi are described. The laboratories study not only the recognition of speech but also its production by artificial means. SIGNALS OF SIGNALS: The neural and mental aspects of speech are reportedly under study by the aphasiologist Esfir Solomonovna Beyn of the USSR Institute of Neurology. WHEN WORDS DO NOT COME FROM THE TONGUE: A session between Dr. Beyn and patients of the Institute of Neurology is related that illustrates the complex and coordinated mosaic making up the sections of the brain having to do with articulation of intelligent speech. HOW DOES THE SPEECH CENTER FUNCTION. A second signal system within the human brain is postulated. BEST 'COMMUNICATIONS SYSTEM:' Characteristics of the human processing of information by the coworkers of Prof. A. N. Leontyev and the psychologists at Moscow Univ. are described. HOW MUCH INFORMATION DO WE INCLUDE. The assistance of cybernetics in the investigation of communication systems is stressed as are the complications afforded by the recently discovered laws of human perception of speech and transformation of information, especially in attempting to evolve speech by machine.

AD-609 797 Div. 30, 4, 9, 12, 14, 17, 25
OTS Prices: HC $5.00/MF $1.25

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
REPORT ON RESEARCH, 1 JANUARY 1962-30 JUNE 1964,
Jul 64, 188p
ARL 64 1

Unclassified report

Descriptors: (*Air force research, Reports), Laboratories, Mathematics laboratories, Physics laboratories, Solid state physics, Chemistry, Metallurgical laboratories, Ceramic materials, Plasma physics, Thermodynamics, Hypersonic flow, Fluid mechanics, Research program administration.

A report is made on research of the Aerospace Research Laboratories. It covers the period from 1 January 1962 through 30 June 1964. Its purpose is to provide military and civilian agencies information on the scope and progress of the Laboratories' programs.

AD-609 822 Div. 30, 22
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
MORRIS DAM BALLISTIC RANGE.
Nov 64, 22p
NOTS TP3560

Unclassified report

Descriptors: (*Ranges (Establishments), Underwater ballistics), (*Test facilities, Underwater ordnance), Air-to-underwater, Underwater, Projectiles, Launching, Data, Underwater trajectories, Damage, Structures, Test equipment, Performance (Engineering), Torpedoes, Underwater equipment.

The Morris Dam Ballistic Range is located on a lake formed by Morris Dam on the San Gabriel River, about

five miles north of Azusa, California. The range facilities are used in the acquisition and study of water entry data, underwater trajectory characteristics and structural damage information on underwater and air to water projectiles. Several facilities are provided for the launching of projectiles. Selection is made on the basis of the type of projectile being tested and the type of data to be acquired. Each test area has available adequate instrumentation capabilities to allow the acquisition of a maximum amount of data with a high degree of reliability.

AD-609 823 Div. 30, 22, 31
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
YFU-44 DEEP DEPTH TEST FACILITY.
Nov 64, 20p
NOTS TP3561

Unclassified report

Descriptors: (*System test vessels, Underwater ordnance), (*Underwater ordnance, System test vessels), (*Antisubmarine defense systems, System test vessels), Test equipment, Underwater, Launching, Torpedoes, Transducers, Sonar, Underwater equipment, Underwater sound.

The YFU-44 Deep Depth Test Facility is a converted LCU equipped and instrumented for underwater torpedo launchings, for underwater transducer tests, and for the study of ocean and target acoustic phenomena. Underwater tests may be conducted at any depth down to 600 feet from a submersible frame lowered through a well in the ship. An air-conditioned room contains the necessary instrumentation for the acquisition, analysis, and recording of test data. If additional instrumentation is required, the vessel can provide facilities to accommodate a mobile van. The location of the equipment permanently installed aboard the vessel is shown.

AD-609 824 Div. 30, 22
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
LONG BEACH SEA RANGE.
Nov 64, 20p
NOTS TP3562

Unclassified report

Descriptors: (*Ranges (Establishments), Underwater ordnance), (*Test facilities, Underwater ordnance), (*Antisubmarine defense systems, Test facilities), Test equipment, System test vessels, Underwater sound, Sound transmission, Underwater equipment, Performance (Engineering), Torpedoes, Underwater, Sonar.

The Long Beach Sea Range covers a sea area of approximately 476 square miles off the coast of Long Beach, California. Supporting shore facilities are located at the Long Beach Naval Station. The location of these facilities with relation to other NOTS range facilities is illustrated on the map facing this page. Fleet support is provided by specially equipped vessels assigned to NOTS and manned by Navy crews. Aircraft, submarines and additional surface vessel support is provided by Pacific Fleet when required for evaluation or proofing of weapons or weapon systems. The primary purpose of the Long Beach Sea Range is the development testing and evaluation of underwater ordnance and ASW systems.
In addition, underwater acoustic studies are conducted and underwater detection methods and equipment are tested and evaluated.

AD-609 830 Div. 30, 2, 14, 16, 17, 25
OTS Prices: HC $5.00/MF $1.00

Office of Aerospace Research, Washington, D. C.
U. S. AIR FORCE ACHIEVEMENTS IN RESEARCH.
1964, 164p

Unclassified report

Prepared in cooperation with the Dodge (F. W.) Co., Div. of McGraw-Hill, Inc., under contract AF49 638 1393.

Descriptors: (*Air force research, Reports), (*Scientific research, Air Force), Engineering, Communication systems, Electronics, Metallurgy, Composite materials, Heat-resistant materials, High-temperature research, Crystallography, Radiochemistry, Solid state physics, Plasma physics, Photography, Mathematics, Biology, Radiobiology, Space medicine, Stress (Physiology), Adaptation (Physiology), Meteorology, Atmosphere, Ionosphere, Micrometeorology.

The report is a presentation of one hundred research accomplishments selected to reflect the scope and quality of the OAR research program.

AD-609 845 Div. 30, 28
OTS Prices: HC $4.00/MF $0.75

Air Force Cambridge Research Labs., Bedford, Mass.
A PROGRAM FOR THE SOLUTION OF A CLASS OF GEOMETRIC-ANALOGY INTELLIGENCE-TEST QUESTIONS.
Physical and mathematical sciences research papers, by Thomas G. Evans. Nov 64, 101p
Proj. 4641
AFCRL 64 884; AFCRL PMSRP64

Unclassified report

Descriptors: (*Artificial intelligence, Pattern recognition), (*Intelligence tests, Pattern recognition), Programming (Computers), Programming languages, Transformations (Mathematics), Topology, Input-output devices, Decision making, Performance (Human), Computers, Analysis, Geometric forms.

A program was constructed for solving a wide variety of intelligence-test problems of the 'geometric-analogy' type: 'Figure A is to Figure B as Figure C is to which of the following figures.' The program, which is written in the LISP language, uses heuristic methods to calculate, from relatively primitive representations of the input figures, descriptions of these figures in terms of subfigures and relations among them. It then utilizes these descriptions to find an appropriate rule and to apply it, modified as necessary, to arrive at an answer. The program solved a large number of such problems, including many taken directly from college-level intelligence tests. The novel organization of the program in terms of figure descriptions, which are analyzed to find transformation rules, and rule descriptions, which are analyzed to find 'common generalizations' of pairs of transformation rules, has implications for the design of problem-solving programs and for machine learning. These implications are discussed at some length and suggestions are made for work on pattern-recognition and learning techniques based on ideas developed in the course of the present investigation. (Author)

AD-609 877 Div. 30, 14
OTS Prices: HC $3.00/MF $0.75

Ohio State Univ., Columbus. Research Foundation.

RESEARCH ON RADIOGRAPHIC TECHNIQUES OF GRAPHITE EVALUATION.
Summary technical rept. for 1 Jun 63-31 May 64, by Merle L. Rhoten. Nov 64, 100p
Contract AF33 657 11245, Proj. 7350, Task 735003
ML TDR64 277

Unclassified report

Descriptors: (*Radiography, Graphite), (*Graphite, Radiography), Test methods, X rays, Absorption, X-ray absorption analysis, Experimental data, Test equipment, Radiographic films, Photographic images, Thickness, Carbon, Density, Energy, Aluminum, Betatrons.

Technique charts are presented for the radiography of graphite in the medium thickness range 2 to 14 inches using typical industrial X-ray equipments. Results of experimental data presented in this report demonstrating the problems in the radiography of graphite are due to scatter radiations and economics of inspection. The thicknesses of graphite billets (now ranging up to 103 inches) present geometrical unsharpness problems as related to economy of inspection. When the X-ray source is removed from the film sufficient distances to obtain a reasonable D/T ratio, exposure times become uneconomical. Techniques reported also demonstrate that better than 1 per cent radiography can readily be obtained using typical industrial techniques and lead filtering, for the ranges of thicknesses from 1/2 to 40 inches. (Author)

31. Ships and Marine Equipment

AD-609 630 Div. 31
OTS Prices: HC $1.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
PREPARATION DATA FOR COMPUTATION OF VERTICAL FLEXURAL MODES OF HULL VIBRATION BY DIGITAL PROCESS,
by Alice W. Mathewson. Sep 49, 15p
DTMB 632; PB 163 877 canceled

Unclassified report

Descriptors: (*Ship hulls, Vibration), Deformation, Shear stresses, Mathematical prediction, Difference equations, Curve fitting, Digital computers, Numerical analysis.

A method is described by which the flexural modes of hull vibration can be calculated--while the ship is still in the design stage--by digital computation. Although the method shows promise of applicability to both horizontal and vertical flexural modes, it is presently recommended for preparation of data on vertical modes only. (Author)

AD-609 631 Div. 31, 9, 15
OTS Prices: HC $2.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
THE STEADY-STATE RESPONSE OF A SHIP HULL TO A SIMPLE HARMONIC DRIVING FORCE COMPUTED BY A DIGITAL PROCESS,
by Emily J. Adams. May 50, 26p
Proj. NS712 065
DTMB 715; PB 163 878 canceled

Unclassified report

Descriptors: (*Ship hulls, Vibration), (*Vibration, Numerical analysis), (*Naval vessels (Support), Vibration), Hulls(Marine), Motion, Hydrodynamics, Shear stresses, Deflection, Difference equations, Harmonic analysis, Numerical methods and procedures, Integration, Moment of inertia.

A numerical method of finding the steady-state response of the hull of a ship to a sinusoidal driving force is described. Results of calculations for the vertical flexural vibrations of the USS NIAGARA (APA87) in response to a vertical driving force applied in the plane of the propeller are given and are compared with experimental data. It is also shown that the vibration of the hull at a frequency other than one of the natural-mode frequencies may be calculated as the sum of the vibrations of the natural modes compounded by a normalization process. In the Appendix a brief set of instructions is given which may be used for the computation of forced vibration. (Author)

AD-609 695 Div. 31, 14, 26
OTS Prices: HC $1.00/MF $0.50

Narmco Research and Development Div., Whittaker Corp., San Diego, Calif.
OPTIMUM FILAMENT DIAMETER.
Supplementary rept. to Annual summary rept.,
by B. Levenetz. 25 Dec 64, 24p
Contract NObs86347, Proj. R007 03 04, Task 1008
AD 605 552 suppl.

Unclassified report

See also AD-605 552.

Descriptors: (*Submarine hulls, Filament wound construction), (*Composite materials, Filament wound construction), (*Filament wound construction, Composite materials), (*Glass textiles, Reinforcing materials), Filaments, Plastics, Sandwich construction, Cylindrical bodies, Rings, Compressive properties, Stresses, Hydrostatic pressure, Failure (Mechanics), Buoyancy, Mechanical properties, Loading (Mechanics), Performance (Engineering).

Comments are made with respect to the available potential of large diameter fibers as a structural composite for deep submersibles. Topics include: theoretical advantages of large diameter fibers, tested properties of large diameter fibers, strength limitation by matrix material, evaluation of the sandwich cylinder test, comparison of candidate materials.

AD-609 881 Div. 31, 30
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
MODIFICATION OF THE RINGROSE CARBON DIOXIDE METER,
Interim rept.,
by S. H. Smith, Jr. 3 Dec 64, 12p
Proj. SF013 08 03 4092
NRL 6175

Unclassified report

Descriptors: (*Carbon dioxide, Meters), (*Meters, Carbon dioxide), (*Monitors, Carbon dioxide), Naval research, Submarines, Poisoning, Gases, Detection, Measurement, Instrumentation, Semipermeable, Membranes, Absorption (Physical), Sodium compounds, Hydroxides, Calcium compounds, Zinc compounds, Oxides, Chlorides, Sulfates.

A carbon dioxide meter manufactured in England by International Gas Detectors, Ltd., was in use in British submarines in 1956. When subjected via field tests to conditions prevailing on U. S. nuclear submarines, it failed to indicate properly after about two days. Upon careful evaluation of the instrument, NRL was able to suggest possible modifications to make the instrument more suitable and IGD appeared willing to cooperate with a modification proect. A prototype Mark II featuring the best combination of changes subsequently suggested by both parties was built and independently evaluated. The English have already equipped their first nuclear submarine, Dreadnought, with four of the instruments. NRL work has shown that, with further minor alterations, the Mark II should be a very useful CO2 meter on U. S. nuclear (and other) submarines. Five of the Mark II's are being purchased, four to be used for distribution and evaluation on submarines and the fifth for NRL use. (Author)

AD-609 888 Div. 31, 4
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
THE STABILIZATION OF MONOETHANOLAMINE SOLUTIONS FOR SUBMARINE CARBON DIOXIDE SCRUBBERS.
Final rept.,
by C. H. Blachly and H. Ravner. 4 Dec 64, 20p
Proj. SF013 08 03 4092
NRL 6189

Unclassified report

Descriptors: (*Submarines, Carbon dioxide), (*Carbon dioxide, Absorption), Air, Purification, Peroxides, Ammonia, Closed-ecological systems, Stabilization systems, Towers (Chemistry).

Monoethanolamine (MEA), the regenerative absorbent used in all CO(2) scrubbers aboard nuclear submarines, is at present stabilized with a chelating agent, the monosodium salt of N, N-diethanolglycine (VFS). In dynamic tests at 131F the additive, although effective in metal-free solutions, did not prevent oxidative degradation of the amine when copper was present in the concentrations usually found in scrubber solutions. Effective stabilization in the presence of copper was given by the tetrasodium salt of ethylenediaminetetraacetic acid (EDTA). At 208F in the presence of several metal contaminants, a combination of VFS and EDTA was required for stabilization. Both VFS and EDTA were shown to be true antioxidants for MEA in their own right. Their reactivity with peroxides, and their prevention of peroxide formation in oxidized MEA suggested that their antioxidant activity resulted from an ability to interrupt an autocatalytic oxidation chain reaction. Less efficient additives did not prevent peroxide formation in MEA. (Author)

32. Miscellaneous Arts and Sciences

AD-609 464 Div. 32, 15
OTS Prices: HC $1.00/MF $0.50

New York State Coll. of Agriculture, Cornell Univ., Ithaca.
NOTE ON REPEATED SELECTION IN THE NORMAL CASE.
Technical rept. no. 19,
by D. S. Robson. Apr 64, 7p BU-166-M
Contract Nonr40939, Proj. NR042 212
Unclassified report

Descriptors: (*Statistical analysis, Genetics), (*Genetics, Selection), (*Plants (Botany), Genetics), Mathematical analysis, Medical research, Plants (Botany), Matrix algebra, Determinants, Integral equations, Statistical distributions, Probability, Biology.

Selection for a quantitative trait often continues for several cycles, as in the successive annual screening of a plant population in the process of developing new varieties. With plant selection, as with most other selection problems, the trait x being selected for cannot be measured without error, and actual selections are based on the observation y = x + e where e is the error chance variable and follows a normal distribution.

AD-609 465 Div. 32, 15
OTS Prices: HC $1.00/MF $0.50

New York State Coll. of Agriculture, Cornell Univ., Ithaca.
ON THE PROBABILITY DISTRIBUTION OF X MODULO n.
Technical rept. no. 20,
by H. E. Schaffer and D. S. Robson. Oct 64, 6p
BU-170-M
Contract Nonr40939, Proj. NR042 212
Unclassified report

Descriptors: (*Statistical analysis, Genetics), (*Genetics, Statistical analysis), Mathematical analysis, Medical research, Probability, Special functions (Mathematical), Complex variables, Series, Functional analysis, Statistical functions, Statistical distributions, Sequential analysis, Chromosomes, Plants (Botany), Biology.

The probability distribution of z = x modulo n is pertinent in problems where a total of x items is proportioned into lots of n items each, leaving a remainder of z items. This problem arises in genetic linkage analysis; if x denotes the number of chromosomal crossovers occuring between two linked heterozygous loci then the gametic frequencies are determined by the probability distribution of x mod 2.

AD-609 548 Div. 32

American Univ., Washington, D. C.
U. S. ARMY AREA HANDBOOK FOR CYPRUS,
by T. W. Adams. 5 Jun 64, 453p
DA PAM550 22
Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $2.00, as D-101.22:550-22.

Descriptors: (*Handbooks, Cyprus), (*Cyprus, Handbooks), Sociology, Economics, Political science, Government (Foreign), Culture, History, Geography, Education, Religion, Law, Labor unions, Industrial relations, Public health, Population, Leadership, Foreign policy, Industries, Agriculture, Communication systems, Armed forces (Foreign), Army.

This book is one of a series of country handbooks designed for use by persons who have need for such background information. The emphasis is on objective description of contemporary national societies, focusing on basic social, economic and political institutions. Treatment is intended to be comprehensive rather than exhaustive. The studies are introductory, and it is expected that the reader will have recourse to many other sources for more detailed information in areas of special interest. Extensive bibliographies are included for this purpose.

AD-609 549 Div. 32

American Univ., Washington, D. C.
U. S. ARMY AREA HANDBOOK FOR ETHIOPIA.
Second ed.,
by George A. Lipsky, Clifford R. Barnett, Wendell Blanchard, Abraham M. Hirsch, and Bela C. Maday.
24 Jun 64, 632p
DA PAM550 28
Unclassified report

Second ed. of rept. dated Oct 60.
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $2.50, as D-101.22:550-28.

Descriptors: (*Handbooks, Ethiopia), (*Ethiopia, Handbooks), Sociology, Economics, Political science, Government (Foreign), Culture, Language, History, Education, Religion, Law, Labor unions, Industrial relations, Public opinion, Public health, Leadership, Propaganda, Foreign policy, Banking, Commerce, Agriculture, Industries, Armed forces (Foreign), Army.

This book is one of a series of country handbooks designed for use by persons who have need for such background information. The emphasis is on objective description of contemporary national societies, focusing on basic social, economic and political institutions. Treatment is intended to be comprehensive rather than exhaustive. The studies are introductory, and it is expected that the reader will have recourse to many other sources for more detailed information in areas of special interest. Extensive bibliographies are included for this purpose.

AD-609 550 Div. 32

American Univ., Washington, D. C.
U. S. ARMY AREA HANDBOOK FOR THE REPUBLIC OF THE SUDAN.
Second ed.,
by John A. Cookson, Howard J. John, Archibald G. MacArthur, Jean McEwen, and Wyatt MacGaffey.
18 Jun 64, 485p
DA PAM550 27
Unclassified report

Second ed. of rept. dated Aug 60.
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $2.00, as D-101.22:550-27.

Descriptors: (*Handbooks, Sudan), (*Sudan, Handbooks), Sociology, Economics, Political science, Government (Foreign), Culture, Language, Education, Religion, History, Geography, Public health, Labor unions, Public opinion, Industrial relations, Law, Foreign

policy, Propaganda, Agriculture, Industries, Banking, Commerce, Armed forces (Foreign), Leadership, Army.

This book is one of a series of country handbooks designed for use by persons who have need for such background information. The emphasis is on objective description of contemporary national societies, focusing on basic social, economic and political institutions. Treatment is intended to be comprehensive rather than exhaustive. The studies are introductory, and it is expected that the reader will have recourse to many other sources for more detailed information in areas of special interest. Extensive bibliographies are included for this purpose.

AD-609 551 Div. 32

American Univ., Washington, D. C.
U. S. ARMY AREA HANDBOOK FOR JAPAN,
Second ed.,
by George L. Harris, Elliot Liebow, Frederica Muhlenberg, Teresa Rakowska-Harmstone, and Frances Chadwick Rintz. 25 Jun 64, 832p
DA PAM550 30

Unclassified report

Second ed. of rept. dated Feb 61.
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $3.25, as D-101.22:550-30.

Descriptors: (*Handbooks, Japan), (*Japan, Handbooks), Sociology, Economics, Political science, Government (Foreign), Culture, History, Geography, Language, Education, Religion, Law, Labor unions, Industrial relations, Public health, Public opinion, Leadership, Propaganda, Foreign policy, Industries, Agriculture, Banking, Commerce, Armed forces (Foreign), Army.

This book is one of a series of country handbooks designed for use by persons who have need for such background information. The emphasis is on objective description of contemporary national societies, focusing on basic social, economic and political institutions. Treatment is intended to be comprehensive rather than exhaustive. The studies are introductory, and it is expected that the reader will have recourse to many other sources for more detailed information in areas of special interest. Extensive bibliographies are included for this purpose.

AD-609 556 Div. 32

American Univ., Washington, D. C.
U. S. ARMY AREA HANDBOOK FOR COLOMBIA.
Second ed.
by Lyman H. Legters, George A. Lipsky, Wendell Blanchard, Abraham M. Hirsch, and Bela C. Maday.
22 Jun 64, 631p
DA PAM550 26

Unclassified report

Second ed. of rept. dated July 61.
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $2.00, as D-101.22:550-26.

Descriptors: (*Handbooks, Columbia), (*Columbia, Handbooks), Sociology, Economics, Political science, Government (Foreign), Culture, History, Geography, Language, Education, Religion, Law, Labor unions, Industrial relations, Public health, Public opinion, Leadership, Propaganda, Foreign policy, Industries, Agriculture, Banking, Commerce, Armed forces (Foreign), Army.

This book is one of a series of country handbooks designed for use by persons who have need for such background information. The emphasis is on objective description of contemporary national societies, focusing on basic social, economic and political institutions. Treatment is intended to be comprehensive rather than exhaustive. The studies are introductory, and it is expected that the reader will have recourse to many other sources for more detailed information in areas of special interest. Extensive bibliographies are included for this purpose.

AD-609 648 Div. 32, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
VALUES OF LARGE GAMES-VII: A GENERAL EXCHANGE ECONOMY WITH MONEY,
by Lloyd S. Shapley. Dec 64, 20p RM-4248-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Game theory, Economics), (*Economics, Game theory), Commerce, Money, Bargaining, Scheduling, Mathematical models, Optimization.

This memorandum concerns an application of the mathematical theory of games to a central problem in theoretical economics. It is one of a series dealing with the techniques of evaluating games with many players. It is shown that the 'Shapley value' solution of a certain general class of competitive markets, regarded as multiperson games, converges to the classical 'competitive equilibrium' solution when the set of traders in the market is expanded homogeneously.

AD-609 659 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
GANEFO I: SPORTS AND POLITICS IN DJAKARTA,
by Ewa T. Pauker. Jul 64, 29p P-2935

Unclassified report

Descriptors: (*Political science, Indonesia), (*Recreation, Indonesia), (*Indonesia, Recreation), (*Foreign policy, Indonesia), Propaganda, Public relations, Culture, Government (Foreign).

GANEFO proved to be an ingenious move at this stage of Indonesia's international politics. It cost Indonesia very little. The political dividends were high for Indonesia. To the underdeveloped and socialist countries Indonesia demonstrated leadership by successfully defying the old and well-established Western tradition of the Olympics. She indirectly snubbed the United States and proved herself capable of putting on a surprisingly well-organized international competition. As an instrument of political warfare, the Games were a success.

AD-609 660 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NATIONAL PRIORITIES AND DEVELOPMENT STRATEGIES IN SOUTHEAST ASIA,
by Charles Wolf, Jr. Dec 64, 21p P-3035

Unclassified report

Prepared for the National Planning Association-University of Hawaii conference on economic planning in Southeast Asia, Honolulu, February 1-5, 1965.

Descriptors: (*Economics, Southeast Asia), (*Management planning, Economics), Scheduling, Production, Commerce, Statistical analysis.

The term 'strategy' is one of a number of terms that have been borrowed from other fields to enrich the vocabulary of development economics. The author assumes that the development strategies of the Southeast Asian countries are reflected by the allocative pattern or emphasis that has actually characterized the path of development traversed during the 1955-1962 period. Of course, 'allocative emphasis' can be analyzed in many ways. In the brief summary presented the author concentrates on three categories of allocation that are prominent in development literature and in policy discussions: namely, allocations (a) among sectors; (b) between public and private activities; and (c) to trade, more particularly to the growth of exports.

AD-609 680 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AFRICAN STUDIES AND ECONOMIC ANALYSIS,
by Benton F. Massell. Dec 64, 5p P-3030
Unclassified report

Descriptors: (*Africa, Economics), (*Economics, Africa), Reviews, Symposia.

A book review written for 'Africa Report' is reproduced. The book is 'Economic Transition in Africa', edited by Melville J. Herskovits and Mitchell Harwitz and published at Evanston, Ill., by Northwestern University Press in 1964. The volume is a collection of papers presented at the Conference on Indigenous and Induced Elements in the Economics of Subsaharan Africa, held at Northwestern University in 1961. The book testifies to the difficulty of achieving an integrated approach to the study of African problems, due to what can be called the dilemma of regional studies. While agreeing with Herskovits that the research value of an area lies in the fact that it affords a locus for the study of problems, it is hard to question the existence in each of us of an inescapable tendency to think largely along disciplinary lines and to balk when called upon to do creative work in another field. Consequently, it comes as no surprise to fine that this volume, while containing much useful material, remains a collection of largely disjoint papers.

AD-609 709 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Univac, Blue Bell, Pa.
MULTI-LIST SYSTEM: ADDITIONAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT,
Technical rept. no. 3,
by Earl G. Fossum, Gilbert Kaskey, Patricia McCarter, and Don F. Mundt. 27 Mar 64, 35p
Contract AF49 638 1194
AFOSR 64 2476
Unclassified report

Descriptors: (*Subject indexing, Classification), Correlation techniques, Statistical analysis, Statistical data, Sampling, Automatic, Word association, Computers, Documentation.

This report continues analyses into the automatic attribute assignment program of the Multi-List System using as basic data a large nonrandom sample of 38,402 DDC (formerly ASTIA) documents. The assignment program now has been extended to include the 599 most frequently used descriptors in the sample file; this comprises those used 72 times or more in the 38,402 documents and represents slightly more than 10% of the 5,577 different descriptors in the sample. In addition, a start has been made into analyzing the characteristics of the pair associations included among these 599 descriptors and some preliminary statistical data are contained in the report.

AD-609 710 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Univac, Blue Bell, Pa.
MULTI-LIST SYSTEM: FINAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
Technical rept. no. 4,
by Earl G. Fossum, Gilbert Kaskey, Forrest Miller, and Don F. Mundt. 1 Oct 64, 38p
Contract AF49 638 1194
AFOSR 64 2477
Unclassified report

See also AD-609 709.

Descriptors: (*Subject indexing, Classification), Correlation techniques, Statistical analysis, Sampling, Automatic, Word association, Computers, Information retrieval.

The report completes the analyses into the automatic attribute group assignment program of the Multi-List System. The array of attribute groups is subject to updating (adjustment) as new documents add new descriptor associations to the file. An analysis is made of the use of the attribute groups as a means of entry to 'lists' of documents having several descriptors or descriptor ranges in common. It is concluded that the technique is not an efficient method of list organization for a document retrieval application; in general, the objective of combining two or three exclusive descriptors into a 'super-key' cannot be achieved. Some of the data characteristics which a file must possess for this method to be efficient are described.

AD-609 752 Div. 32, 18, 28
OTS Prices: HC $5.00/MF $1.25

Bureau of Social Science Research, Inc., Washington, D. C.
HISTORICAL INCIDENTS OF EXTREME OVERCROWDING.
Final rept.,
by Albert D. Biderman, Margot Louria, and Joan Bacchus. Mar 63, 194p BSSR-354-5
Contract OCD OS62 122
Unclassified report

Descriptors: (*Civil defense systems, Housing), (*Shelters, Civil defense systems), (*Housing, History), (*Group dynamics, Housing), Prisoners, Casualties, Refugees, Hospitals, Mental disorders, Japan, United States, Population, Israel, Military personnel, Transportation.

The primary orientation of the review was to gain knowledge of possible hazards to life and health under conditions of overcrowding that might occur in civil defense shelters. Various types of historical incidents have produced degrees of crowding--along with associated

noxious and deprivational circumstances--far more severe and of longer duration than has been or can be subject to experimental test. Conditions beyond those ordinarily accepted as the limits of human tolerance have been withstood on many occasions by large proportions of the victims of certain catastrophic occurrences. In a number of other circumstances, including some involving only moderately intense crowding, very high death and impairment rates have been present. Physical crowding, per se, is not regarded as a fruitful unitary concept for examining the differences between high and low casualty events. For most of the range of densities, physical crowding has significance only in interdependent relationship with many other variable features of the entire situation, including environmental, structural, temporal, psychological, and social features. The acts of oppressive captors and epidemic disease were the most frequent direct causes of high fatality in the incidents reviewed.

AD-609 825 Div. 32
OTS Prices: HC $1.00/MF $0.50

Hughes Aircraft Co., Culver City, Calif.
ROLE OF THE TECHNICAL LIBRARY IN SUPPORT OF AN INFORMATION CENTER,
by M. Bloomfield. Nov 64, 21p TM-804
Unclassified report

Also pub. as EPIC-S-5, AD-608 377.

Descriptors: (*Information retrieval, Libraries), (*Libraries, Information retrieval), (*Scientific research, Information retrieval), Documentation, Reports, Indexes, Abstracting, Periodicals, Storage.

The information center is defined as that organization which acquires, stores, indexes, analyzes and synthesizes data and information. The library acquires, indexes, stores and disseminates documents and information. The information center's major product appears in reports which have evaluated, analyzed, integrated and synthesised the data of a special scientific topic and presented it in graphic or tabular form. The library supports the activities of the information center by providing for its acquisitions. The library can also provide assistance to the information center through its familiarity with information retrieval principles. The information center can rely on the library to provide it with indexing and abstracting tools which provide a means of access to related information. The library also supports the information center with its current awareness announcement bulletins. (Author)

AD-609 873 Div. 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
ECONOMICS DEPARTMENT PUBLICATIONS, 1959-1964: AN AUTHOR INDEX OF THE OPEN LITERATURE, WITH ABSTRACTS.
Memo. rept.,
by Harriett Porch. Jan 65, 95p RM-2800-1, suppl.
Unclassified report

Supplement to AD-287 175.

Descriptors: (*Economics, Indexes), (*Bibliographies, Economics), Abstracting, Reports, Subject indexing, Documentation.

This is an author index for RAND Economics Department publications issued between January 1, 1959 and December 31, 1964, and available in the open literature. Titles and abstracts for publications from 1948 through 1962 may be found in RM-2800-1. Both that Memorandum and this supplement include monographs (books and 'Reports'), less formal monographs or working papers ('RAND Memoranda'), and professional contributions of the journal-type ('Papers').

33. Transportation

AD-609 755 Div. 33
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MODELS OF URBAN CHANGE: THEIR ROLE IN URBAN TRANSPORTATION RESEARCH,
by Charles J. Zwick. Oct 62, 18p P-2651
Unclassified report

Prepared for presentation at the Annual Meeting and Transportation Engineering Conference of the American Society of Civil Engineers, Detroit, Mich., 8-12 Oct 62.

Descriptors: (*Urban areas, Transportation), (*Transportation, Urban planning), Analysis, Economics, Population, Distribution, Feedback, Scientific research, Models (Simulations).

A general discussion is presented of the role of urban change models in urban transportation research; and a description is given of work currently underway on urban transportation.

AD-609 756 Div. 33
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TRANSPORTATION FOR FUTURE URBAN COMMUNITIES: A STUDY PROSPECTUS.
10 Aug 61, 52p RM-2824-FF
Unclassified report

Sponsored by the Ford Foundation.

Descriptors: (*Urban areas, Transportation), (*Transportation, Urban areas), Urban planning, Traffic, Housing, Passenger vehicles, Modes (Simulations), Population, Scientific research.

A tentative proceedure for a study of urban transportation is outlined.

AD-609 758 Div. 33, 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
A MULTIPLE EQUATION MODEL OF HOUSEHOLD LOCATIONAL AND TRIPMAKING BEHAVIOR,
by J. F. Kain. Apr 62, 74p RM-3086-FF
Unclassified report

Sponsored by the Ford Foundation.

Descriptors: (*Transportation, Urban planning), (*Traffic, Mathematical models), (*Urban planning, Transportation), (*Mathematical models, Urban planning), Urban areas, Housing, Population, Least squares method, Statistical analysis, Economics, Passenger vehicles, Statistical data.

This Memorandum describes a multiple equation model of household locational and tripmaking behavior, to be used in RAND's study of urban transportation. The model presented here is a multiple equation recursive model, estimated by applying least squares multiple regression techniques to cross-sectional data obtained from the Detroit Area Traffic Study's home-interview origin and destination study. The worktrips of more than 40,000 sampled workers were aggregated to 254 spatially separate workplace zones. The model explains four types of locational and tripmaking behavior for the white workers employed in these 254 zones: residential space consumption, automobile ownership, modal choice, and length of journey-to-work. In all, the final model has seven statistical and two definitional equations. The dependent variables for these nine equations include four measures for residential space consumption, one for auto ownership, three for mode choice, and one for length of journey-to-work.

AD-609 771 Div. 33
OTS Prices: HC $2.00/MF $0.75

RAND Corp., Santa Monica, Calif.
A FIRST APPROXIMATION TO A RAND MODEL FOR STUDY OF URBAN TRANSPORTATION,
by J. F. Kain and J. R. Meyer. Nov 61, 54p
RM-2878-FF
Unclassified report

Descriptors: (*Urban areas, Transportation), (*Transportation, Mathematical models), Statistical analysis, Economics, Urban planning, Government employees, Simulation, Distribution, Design.

The report represents a first step in a study to develop a generalized model of an urban complex, for studying the intricate interrelationships between transportation and the spatial organization of economic activities. Consideration is given to definitions and notation, workplace location and nonresidential land-use models, industrial land-use constraints, employment distributions, land value surfaces, residential distributions, residential land-use contraints, status variable modifications, and transportation models.

How To Use New Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

CORPORATE AUTHOR-MONITORING AGENCY INDEX

The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry (designated by an asterisk) for each document are listed the originator of the report, the originator's report number, the title, AD number, and division number. If the source has listed a monitoring agency in the report, the monitor acronym and monitor series number are given in parantheses directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown below.

*SHEFFIELD UNIV (ENGLAND)
* * *
HIC 45
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
(AFOSR 64 2029)
AD-608 206 DIV. 25

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
* * *
64 2029
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
AD-608 206 DIV. 25

SUBJECT INDEX

The Subject Index is arranged alphabetically by asterisked descriptors from the document announcements in the TAB. Each announcement contains one or more asterisked descriptors which identify the main subjects of the report. The asterisked descriptor may or may not have a modifying descriptor appearing directly below the asterisked descriptor. Under each descriptor entry in the Subject Index appear the following items of information: annotation, AD number, and division number. A typical subject index entry is shown on the next page.

*COMBUSTION
OSCILLATION
INTENTIONAL COMBUSTION
OSCILLATIONS IN PROPULSION
SYSTEMS
AD-608 206 DIV. 25

PERSONAL AUTHOR INDEX

The Personal Author Index is arranged alphabetically by the last names of the authors of reports. When several report entries are given for one author, the entries are arranged numerically by AD number. Division numbers and titles are also listed. Again, three asterisks serve as a separator between entries for reports under the same author. A typical personal author entry is shown below.

*BENDAT, JULIUS S.
* * *
ZERO CROSSINGS OF A SINE
WAVE PLUS RANDOM NOISE
AD-608 019 DIV. 15
* * *
SPECTRA AND AUTOCORRELATION
FUNCTIONS FOR FULLY DEVELOPED
SEAS AND PREDICTION OF STRUCTURAL
FATIGUE DAMAGE
AD-608 464 DIV. 2

CONTRACT INDEX

The Contract index is arranged alphanumerically by contract number. Within a contract grouping, each entry contains corporate author, series number (if any), monitor number (if any), AD number, and division number.

When there are multiple document entries under one contract number, entries are arranged by AD number under each corporate author represented.

A contract entry may also contain a letter F, A, or S on the left-hand margin, indicating that the document is a Final, Annual, or Summary report. A typical contract entry is shown below.

*AF19 628 500
LINCOLN LAB MASS INST OF TECH
LEXINGTON
LL TR 365
(ESD TDR64 378)
AD-608 272 DIV. 30
LL 1964 63
(ESD TDR64 566)
AD-608 288 DIV. 8

AD-DIVISION INDEX

The AD-Division Index is arranged numerically by AD number and lists the subject division where the full entry can be located in TAB.

SUBJECT INDEX

•ABSORPTION SPECTRUM
GASES
AUTOIONIZATION SPECTRA OF GASES OBSERVED IN THE VACUUM ULTRAVIOLET.
AD-609 849 DIV. 25

•ABSORPTION
PHOTONS
CHOICE OF AN APPROPRIATE MEAN ABSORPTION COEFFICIENT FOR USE IN THE GENERAL GREY GAS EQUATIONS.
AD-609 838 DIV. 25

•ABSTRACTS
CONTROL SYSTEMS
RESEARCH INVESTIGATIONS IN SYSTEMS THEORY.
AD-609 490 DIV. 30

•ACCLIMATIZATION
POLAR REGIONS
TRANSLATION OF RUSSIAN RESEARCH: CERTAIN PHYSIOLOGICAL SHIFTS IN THE HUMAN ORGANISM DURING ACCLIMATIZATION IN THE INTRACONTINENTAL REGIONS OF ANTARCTICA.
AD-609 790 DIV. 16

•ACOUSTICS
ROCKET PROPELLANTS
ACOUSTIC WAVE-BURNING ZONE INTERACTION IN SOLID PROPELLANTS.
AD-609 817 DIV. 10
ACOUSTIC WAVE-BURNING ZONE INTERACTION IN SOLID PROPELLANTS.
AD-609 818 DIV. 10
ACOUSTIC ADMITTANCE OF BURNING SOLID PROPELLANT SURFACE.
AD-609 885 DIV. 10
ORIGIN AND PROPAGATION OF DISTURBANCE IN THE BURNING OF SOLID PROPELLANTS.
AD-609 886 DIV. 10
ORIGIN AND PROPAGATION OF DISTURBANCE IN THE BURNING OF SOLID PROPELLANTS.
AD-609 887 DIV. 10

UNDERWATER COMMUNICATION SYSTEMS
COMMUNICATION CHARACTERISTICS OF AN UNDERWATER ACOUSTIC SIGNAL REFLECTED FROM A SPACE AND TIME RANDOM SURFACE.
AD-609 627 DIV. 5

•ADAPTIVE COMMUNICATION SYSTEMS
CODING
ERROR CONTROL THROUGH CODING. ADAPTIVE ERROR CONTROL SYSTEMS.
AD-609 473 DIV. 8

•ADJUSTMENT (PSYCHOLOGY)
GROUP DYNAMICS
COMPATIBILITY AMONG WORK ASSOCIATES IN ISOLATED GROUPS.
AD-609 549 DIV. 28

•AERIAL CAMERAS
ELECTROPHOTOGRAPHY
RESEARCH AND DEVELOPMENT ON PHOTOCONDUCTIVE PHOTO-TAPE.
AD-609 768 DIV. 24

•AERODYNAMIC CONTROL SURFACES
HYPERSONIC FLOW
PRESSURE MEASUREMENTS FOR MACH 8 FLOWS OVER EXPANSION CORNERS AND RAMPS ON AN INTERNALLY COOLED MODEL. PART II. FLOWS OVER A FLAT PLATE WITH AND WITHOUT A PARTIAL SPAN RAMP. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS.
AD-609 458 DIV. 9

•AERODYNAMIC HEATING
FRICTION
TRANSLATION OF RUSSIAN RESEARCH: DEPENDENCE BETWEEN AERODYNAMIC HEAT TRANSFER AND FRICTION.
AD-609 788 DIV. 9

•AEROSOL GENERATORS
EFFECTIVENESS
CALCULATION OF EFFICIENCIES OF AEROSOL GENERATING DEVICES FROM FLUX MEASUREMENTS OBTAINED IN FIELD TRIALS.
AD-609 840 DIV. 3

•AEROSOLS
MEASUREMENT
CALCULATION OF EFFICIENCIES OF AEROSOL GENERATING DEVICES FROM FLUX MEASUREMENTS OBTAINED IN FIELD TRIALS.
AD-609 840 DIV. 3

•AFRICA
ECONOMICS
BOOK REVIEW FOR 'AFRICA REPORT' ON 'ECONOMIC TRANSITION IN AFRICA', EDITED BY M. J. HERSKOVITS AND M. HARWITZ (EVANSTON, NORTHWESTERN UNIV. PRESS, 1964).
AD-609 680 DIV. 32

•AGING (MATERIALS)
INTERMETALLIC COMPOUNDS
MECHANICAL BEHAVIOR OF THE INTERMETALLIC COMPOUNDS VCO3, VNI3, AND VNI2.
AD-609 706 DIV. 17

•AIR FORCE EQUIPMENT
TEST METHODS
SYSTEM INSTALLATION AND TESTING.
AD-609 477 DIV. 18

•AIR FORCE RESEARCH
REPORTS
REPORT ON RESEARCH OF THE AEROSPACE RESEARCH LABORATORIES COVERING THE PERIOD 1 JANUARY 1962-30 JUNE 1964.
AD-609 797 DIV. 30
U. S. AIR FORCE ACHIEVEMENTS IN RESEARCH.
AD-609 830 DIV. 30

•AIR MASS ANALYSIS
UPPER ATMOSPHERE
DIURNAL AND SEMIDIURNAL VARIATIONS OF ISOPYCNIC SURFACES UP TO THE MESOPAUSE AS INFERRED BY THE WIND FIELD.
AD-609 723 DIV. 2

•AIR TRAFFIC CONTROL SYSTEMS
RADAR EQUIPMENT
RADAR DATA MEASURING SYSTEM FOR AIRCRAFT SIGNAL ENERGY RETURNS.
AD-609 497 DIV. 19

•AIRCRAFT ENGINES
FAILURE (MECHANICS)
SPECTROMETRIC ANALYSIS OF AIRCRAFT OILS AS A MEANS OF PREDICTING ENGINE FAILURE.
AD-609 743 DIV. 27
EFFECTIVENESS OF THE SPECTROMETRIC OIL ANALYSIS METHOD FOR MONITORING AIRCRAFT MECHANISMS.
AD-609 746 DIV. 27

FLUID MECHANICS
TRANSLATION OF RUSSIAN RESEARCH: GASDYNAMICS OF ENGINES.
AD-609 452 DIV. 2

•AIRCRAFT EQUIPMENT
FAILURE (MECHANICS)
EFFECTIVENESS OF THE SPECTROMETRIC OIL ANALYSIS METHOD FOR MONITORING AIRCRAFT MECHANISMS.
AD-609 746 DIV. 27

•AIRCRAFT FIRES
FIRE SAFETY
STRUCTURAL DESIGN FOR FUEL CONTAINMENT UNDER SURVIVABLE CRASH CONDITIONS.
AD-609 618 DIV. 1

•AIRFOILS
TRANSONIC FLOW
EXTENSION OF THE M2- AND THE THIN-WING EXPANSION METHODS TO MAGNETOHYDRODYNAMICS.
AD-609 568 DIV. 9

•AIRPLANE ENGINE OILS
SPECTROSCOPY
SPECTROMETRIC ANALYSIS OF AIRCRAFT OILS AS A MEANS OF PREDICTING ENGINE FAILURE.
AD-609 743 DIV. 27
EFFECTIVENESS OF THE SPECTROMETRIC OIL ANALYSIS METHOD FOR MONITORING AIRCRAFT MECHANISMS.
AD-609 746 DIV. 27

•AIRPLANES
STABILITY
TRANSLATION OF RUSSIAN RESEARCH: LONGITUDINAL STABILITY OF AN AIRPLANE WITH DELAYED ACTION AUTOPILOT.
AD-609 781 DIV. 1

•ALGEBRAIC TOPOLOGY
DIFFERENTIAL GEOMETRY
ABSOLUTE EQUIVALENCE OF EXTERIOR DIFFERENTIAL SYSTEMS.
AD-609 687 DIV. 15

GAME THEORY
TOPICS IN ANALYSIS. THEORETICAL MATHEMATICS.
AD-609 614 DIV. 15

THEOREMS
AN IMBEDDING OF CLOSED RIEMANN SURFACES IN EUCLIDEAN SPACE.
AD-609 866 DIV. 15

•ALGEBRA
AUTOMATA
ALGEBRAIC THEORY OF MACHINES. I. THE MAIN DECOMPOSITION THEOREM. PRIME DECOMPOSITION THEOREM FOR FINITE SEMIGROUPS.
AD-609 581 DIV. 30

•ALIPHATIC COMPOUNDS
RADIATION CHEMISTRY
RADIATION CHEMISTRY OF ACETYLENIC COMPOUNDS.
AD-609 490 DIV. 4

•ALKALI METALS
AMMONIA
COMPOSITION OF DILUTE ALKALI METAL-AMMONIA SOLUTIONS.
AD-609 578 DIV. 4

•ALKALINE CELLS
ELECTRODES
LOW TEMPERATURE CYCLING BEHAVIOR OF THE SILVER ELECTRODE.
AD-609 876 DIV. 7

•ALLOYS
CRYOGENICS
CRYOGENIC MATERIALS DATA HANDBOOK.
AD-609 562 DIV. 25

PHASE STUDIES
TRANSLATION OF RUSSIAN RESEARCH: INFLUENCE OF ALLOYING ON THE HARDNESS OF NIAI AND ITS SOLID SOLUTIONS.
AD-609 783 DIV. 17

•ALUMINUM ALLOYS
CORROSION
CORROSION OF METALS IN TROPICAL ENVIRONMENTS. PART 6. ALUMINUM AND MAGNESIUM.
AD-609 618 DIV. 17

CRYOGENICS
CRYOGENIC MATERIALS DATA HANDBOOK.
AD-609 562 DIV. 25

HARDNESS
TRANSLATION OF RUSSIAN RESEARCH: INFLUENCE OF ALLOYING ON THE HARDNESS OF NIAI AND ITS SOLID SOLUTIONS.
AD-609 783 DIV. 17

HONEYCOMB CORES
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 867 DIV. 26
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 868 DIV. 26
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 871 DIV. 26

WELDING
DIRECT-CURRENT MANUAL WELDING OF 2014-T6 ALUMINUM.
AD-609 814 DIV. 26

MANUAL 'FREE' WELDING OF 2014-T6 ALUMINUM.
AD-609 517 DIV. 26

WELDS
EVALUATION OF 6061-T6 TO 2014-T6 AND 6061-T6 TO 6061-T6 ALUMINUM ALLOY WELDS.
AD-609 518 DIV. 26

•ALUMINUM
SOLID ROCKET PROPELLANTS
ROLE OF ALUMINUM AND ITS OXIDES IN SOLID PROPELLANT EXHAUST.
AD-609 591 DIV. 10

•AMMONIA
ALKALI METALS
COMPOSITION OF DILUTE ALKALI METAL-AMMONIA SOLUTIONS.
AD-609 578 DIV. 4

SOLUTIONS
EFFECT OF ADDED ELECTROLYTES OF THE E. S. R. AND OPTICAL ABSORPTION OF METAL-AMMONIA SOLUTIONS.
AD-609 557 DIV. 4

•AMMONIUM COMPOUNDS
HALIDES
RATE OF SUBLIMATION OF AMMONIUM HALIDES.
AD-609 814 DIV. 4

•AMPLIFIERS
LASERS
SEMICONDUCTOR LASER AMPLIFIER TECHNIQUES (SEMLAM).
AD-609 704 DIV. 25

PROGRAMMING (COMPUTERS)
ANALOG COMPUTER TECHNIQUES FOR PROBLEMS IN COMPLEX VARIABLES.
AD-609 733 DIV. 30

•ANALOG COMPUTERS
COMPLEX VARIABLES
ANALOG COMPUTER TECHNIQUES FOR PROBLEMS IN COMPLEX VARIABLES.
AD-609 733 DIV. 30

•ANTENNAS
COMMUNICATION SATELLITES (ACTIVE)
DESIGN APPROACHES FOR SATELLITE ANTENNAS.
AD-609 616 DIV. 8

FLIGHT CONTROL SYSTEMS
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME II. DETAILED ANALYSIS OF ANTENNAS, PROPAGATION, POLARIZATION, AND PERFORMANCE.
AD-609 751 DIV. 12

SPACECRAFT
STUDY OF ADVANCED ANTENNA SYSTEMS PROBLEMS FOR SPACE VEHICLES.
AD-609 703 DIV. 6

•ANTIFRICTION BEARINGS
LUBRICATION
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
AD-609 437 DIV. 14

•ANTISUBMARINE DEFENSE SYSTEMS
SYSTEM TEST VESSELS
YFU-44 DEEP DEPTH TEST FACILITY. UNDERWATER ORDNANCE TEST FACILITY.
AD-609 823 DIV. 30

TEST FACILITIES
LONG BEACH SEA RANGE. UNDERWATER ORDNANCE TEST FACILITY.
AD-609 824 DIV. 30

•APTITUDE TESTS
SCIENTIFIC PERSONNEL
IDENTIFYING RESEARCH CHARACTERISTICS IN HIGH SCHOOL STUDENTS; SEARCH METHODS FOR SCIENTIFIC TALENT FOR MILITARY PERSONNEL RECRUITMENT.
AD-609 489 DIV. 23

•ARCTIC REGIONS
SOLAR RADIATION
RADIATIVE ENERGY EXCHANGE OVER ARCTIC LAND AND SEA.
AD-609 583 DIV. 2

•ARGON
PLASMA JETS
THERMAL CHARACTERISTICS OF A HIGH AND LOW MASS FLUX ARGON PLASMA JET.
AD-609 622 DIV. 25

•ARMED FORCES PROCUREMENT
MANAGEMENT ENGINEERING
VALUE ANALYSIS (VALUE NGINEERING). A TECHNIQUE FOR OBTAINING MORE VALUE FOR THE DEFENSE DOLLAR.
AD-609 920 DIV. 18
SUPPLEMENT TO 'MANAGEMENT OF VALUE ENGINEERING PROGRAMS IN DEFENSE CONTRACTS': INSTRUCTOR'S NOTES FOR CASE PROBLEMS IN THE CONTRACTUAL ASPECTS OF VALUE ENGINEERING.
AD-609 883 DIV. 18
SUPPLEMENT TO 'MANAGEMENT OF VALUE ENGINEERING PROGRAMS IN DEFENSE CONTRACTS': TRAINING AIDS: DESCRIPTION AND FORMAT.
AD-609 884 DIV. 18

•ARMED FORCES (FOREIGN)
WEST GERMANY
TRANSLATION OF PRESS ITEM REGARDING USE OF DATA PROCESSING BY TERMINOLOGY GROUP OF THE WESTERN GERMANY ARMED FORCES IN MANNHEIM.
AD-609 620 DIV. 30

•ARMED FORCES
USSR
TRANSLATION OF 'RED STAR' ARTICLE WITH DISCUSSION OF ARTICLE BY LT. COL. L. GONCHAROV ENTITLED 'THE COMMANDER AND TIME.'
AD-609 644 DIV. 18

•ARMING DEVICES
DESIGN
DESIGN AND DEVELOPMENT OF MECHANICAL MODULAR PROGRAMMER.
AD-609 737 DIV. 22

•ARMORED VEHICLES
TITANIUM ALLOYS
U. S. ARMY REQUIREMENTS FOR TITANIUM ALLOYS WITH RESPECT TO VEHICULAR APPLICATIONS. ALPHA-BETA TITANIUM ALLOY.
AD-609 673 DIV. 17

•ARMOR
TEST METHODS
BALLISTIC CONCEPTS EMPLOYED IN TESTING LIGHTWEIGHT ARMOR.
AD-609 690 DIV. 22

•ARMY EQUIPMENT
VEHICLES
POTENTIAL OF CASTINGS IN FUTURE ARMY VEHICLES.
AD-609 671 DIV. 26

•AROMATIC COMPOUNDS
CHROMATOGRAPHIC ANALYSIS
DETERMINATION OF STYRENE MONOMER IN POLYESTER RESINS BY GAS-LIQUID CHROMATOGRAPHY.
AD-609 669 DIV. 4

•ARTIFICIAL INTELLIGENCE
PATTERN RECOGNITION
PROGRAM FOR THE SOLUTION OF A CLASS OF GEOMETRIC-ANALOGY INTELLIGENCE-TEST QUESTIONS; MACHINE ANALYSIS AND SOLUTION TO PROBLEMS.
AD-609 849 DIV. 30

SPEECH RECOGNITION
TRANSLATION OF RUSSIAN ARTICLE ON SPEECH, ITS RECOGNITION AND BRAIN TRANSMISSION AND ATTENDANT PROCESSES.
AD-609 789 DIV. 30

•ASBESTOS
FRACTURE (MECHANICS)
COMPARISON OF EXTENDED POLYETHYLENE AND CHRYSOTILE ASBESTOS FRACTURE SURFACES.
AD-609 608 DIV. 14

•ASTRONAUTICS
RENDEZVOUS SPACECRAFT
DESIGN AND OPERATION OF A SPACE RENDEZVOUS SIMULATOR.
AD-609 748 DIV. 12

•ASTRONAUTS
PRESSURE SUITS
MOMENTS OF INERTIA AND CENTERS OF GRAVITY OF THE LIVING HUMAN BODY ENCUMBERED BY A FULL-PRESSURE SUIT.
AD-609 863 DIV. 16

•ASTRONOMY
METEORITES
NOTES ON THE BEGINNINGS OF MODERN METEORITICS.
AD-609 879 DIV. 2

•ATMOSPHERE ENTRY
REVIEWS
RE-ENTRY PHYSICS RESEARCH: AERODYNAMIC PHENOMENA ASSOCIATED WITH REENTRY VEHICLES.
AD-609 736 DIV. 9

•ATMOSPHERE MODELS
REFRACTION
MODEL OF ATMOSPHERIC REFRACTIVITY AND THEORETICAL HEIGHTS OF RADIO-RADAR RAYS FOR MIAMI, FLORIDA.
AD-609 921 DIV. 8

•ATMOSPHERE
CHEMICAL REACTIONS
CHANGES IN THE CHEMICAL COMPOSITION OF THE ATMOSPHERE FOLLOWING INTENSE IONIZATION IMPULSES.
AD-609 792 DIV. 2

RADAR INTERFERENCE
PROJECT WIDE BAND.
AD-609 619 DIV. 6

•ATMOSPHERIC MOTION
HEAT TRANSFER
HEAT TRANSPORT BY LARGE-SCALE ATMOSPHERIC WAVES DURING OCTOBER 1959-MARCH 1960.
AD-609 803 DIV. 2

•ATMOSPHERIC REFRACTION
RADIO WAVES
MODEL OF ATMOSPHERIC REFRACTIVITY AND THEORETICAL HEIGHTS OF RADIO-RADAR RAYS FOR MIAMI, FLORIDA.
AD-609 921 DIV. 8

•ATMOSPHERIC SOUNDING
AIR MASS ANALYSIS
DIURNAL AND SEMIDIURNAL VARIATIONS OF ISOPYCNIC SURFACES UP TO THE MESOPAUSE AS INFERRED BY THE WIND FIELD.
AD-609 723 DIV. 2

AURORAE
ROCKET MEASUREMENTS WITH ELECTRON AND ION PROBES IN AN AURORA.
AD-609 484 DIV. 2

REFRACTIVE INDEX
PROCEEDINGS OF THE TROPOSPHERIC REFRACTION EFFECTS MEETING (NO. 3). VOLUME I. RESULTS AND STATUS OF TROPOSPHERIC-EFFECTS MEASUREMENT PROGRAM.
AD-609 731 DIV. 8

•ATOMIC CLOCKS
CESIUM ELECTRON TUBES
ATOMIC OSCILLATOR DEVICE FOR NAVIGATION-GUIDANCE.
AD-609 776 DIV. 8

STANDARDS
USAEL PRIMARY FREQUENCY STANDARDS.
AD-609 795 DIV. 8

•ATTITUDE INDICATORS
RADIO INTERFEROMETERS
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME I. SYSTEM DESCRIPTION AND ANALYSIS.
AD-609 750 DIV. 12
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME II. DETAILED ANALYSIS OF ANTENNAS, PROPAGATION, POLARIZATION, AND PERFORMANCE.
AD-609 751 DIV. 12

•AUDITORY PERCEPTION
ADAPTATION (PHYSIOLOGY)
LATERALIZATION OF SOUNDS AT THE UNSTIMULATED EAR OPPOSITE TO A NOISE-ADAPTED EAR.
AD-609 496 DIV. 28

MODEL TESTS
A SIMPLE LINEAR MODEL FOR VOWEL PERCEPTION.
AD-609 493 DIV. 16

PROBABILITY
DETECTION OF MARKOVIAN SEQUENCES OF SIGNALS.
AD-609 497 DIV. 28

•AURORAE
ATMOSPHERIC SOUNDING
ROCKET MEASUREMENTS WITH ELECTRON AND ION PROBES IN AN AURORA.
AD-609 494 DIV. 2

•AUTOMATIC PILOTS
AIRPLANES
TRANSLATION OF RUSSIAN RESEARCH: LONGITUDINAL STABILITY OF AN AIRPLANE WITH DELAYED ACTION AUTOPILOT.
AD-609 781 DIV. 1

•AVIATION PERSONNEL
EDUCATION
INVESTIGATION OF UNPREDICTED DIFFERENCES IN ATTRITION RATES AMONG NAVAL AVIATION STUDENTS FROM DIFFERENT PROCUREMENT SOURCES.
AD-609 668 DIV. 23

•AVIATION SAFETY
FUEL TANKS
STRUCTURAL DESIGN FOR FUEL CONTAINMENT UNDER SURVIVABLE CRASH CONDITIONS.
AD-609 615 DIV. 1

•BALL BEARINGS
LUBRICATION
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
AD-609 937 DIV. 14

•BARIUM COMPOUNDS
TITANATES
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200C.
AD-609 639 DIV. 8

•BEAMS (STRUCTURAL)
HYDRODYNAMICS
FORCED VIBRATION OF BEAMS AND FLUTTER OF BEAM-FOIL SYSTEMS.
AD-609 499 DIV. 9

•BEHAVIOR
MOTIVATION
STRUCTURAL FACTORS AND INDIVIDUAL NEEDS IN GROUP BEHAVIOR.
AD-609 996 DIV. 28

STIMULATION
DIMENSIONS OF STIMULUS SITUATIONS WHICH ACCOUNT FOR BEHAVIOR VARIANCE.
AD-609 739 DIV. 28

•BERYLLIUM COMPOUNDS
OXIDES
PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
AD-609 686 DIV. 8

•BIBLIOGRAPHIES
ECONOMICS
ECONOMICS DEPARTMENT PUBLICATIONS, 1959-1964: AN AUTHOR INDEX OF THE OPEN LITERATURE, WITH ABSTRACTS.
AD-609 873 DIV. 32

GLASS TEXTILES
GLASS/RESIN INTERFACE: PATENT SURVEY, PATENT LIST, AND GENERAL BIBLIOGRAPHY.
AD-609 926 DIV. 14

SCIENTIFIC RESEARCH
PROFESSIONAL PAPERS CLEARED FOR POSSIBLE PUBLICATION AND/OR PRESENTATION.
AD-609 964 DIV. 30

•BIBLIOGRAPHY
RESEARCH PROGRAM ADMINISTRATION
SELECTIVE AND ANNOTATED BIBLIOGRAPHY ON RESEARCH, DEVELOPMENT, TESTING AND EVALUATION OF MILITARY ITEMS.
AD-609 939 DIV. 13

•BIOLOGICAL WARFARE
ARMED FORCES RESEARCH
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES.
AD-609 809 DIV. 3
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES, VOLUME I.
AD-609 808 DIV. 3
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES. VOLUME II.
AD-609 806 DIV. 3

•BIONICS
PATTERN RECOGNITION
A HEURISTIC APPROACH TO SOLUTION OF CHECKERBOARD PUZZLES.
AD-609 970 DIV. 30

•BLUNT BODIES
SUPERSONIC CHARACTERISTICS
SOLUTION OF THE INVISCID FLOW DUE TO DISPLACEMENT BY THE METHOD OF INTEGRAL RELATIONS.
AD-609 869 DIV. 9

•BORIDES
THERMOELECTRICITY
THERMOELECTRIC POWER OF THE TRANSITION METAL DIBORIDES.
AD-609 816 DIV. 25

•BOUNDARY LAYER
FLUID FLOW
LOCAL BOUNDARY LAYER APPROXIMATIONS OF REGULAR FLOWS PAST A SEMI-INFINITE PLATE.
AD-609 599 DIV. 9

•BOUNDARY VALUE PROBLEMS
ELECTROMAGNETISM
ON ANALYTIC CONTINUATION OF A CLOSED REGION SOLUTION TO AN OPEN REGION.
AD-609 897 DIV. 8

•BRAZIL
SOCIAL SCIENCES
U. S. ARMY AREA HANDBOOK FOR BRAZIL.
AD-609 983 DIV. 18

•BRITTLENESS
FRACTURE (MECHANICS)
TEMPERATURE-STRAIN RATE AND THE BRITTLE FRACTURE PROBLEM.
AD-609 666 DIV. 17

•BROMINE
ATOMIC ENERGY LEVELS
VIBRATIONAL LEVELS IN LIQUID BROMINE BY NEUTRON INELASTIC SCATTERING.
AD-609 678 DIV. 20

•BUCKLING (MECHANICS)
STRUCTURAL SHELLS
BUCKLING CHARACTERISTICS OF THIN CYLINDRICAL SHELLS SUBJECTED TO AXIAL COMPRESSION AND INTERNAL PRESSURE.
AD-609 688 DIV. 25
TRANSLATION OF CZECHOSLOVAKIAN RESEARCH: NON SYMMETRICAL BUCKLING OF A FLAT ROUNDED SHELL WITH INITIAL DEFORMATION FROM EXTERNAL PRESSURE.
AD-609 780 DIV. 25

•CALCULUS OF VARIATIONS
DYNAMIC PROGRAMMING
A DYNAMIC PROGRAMMING APPROACH TO THE NONPARAMETRIC PROBLEM IN THE CALCULUS OF VARIATIONS.
AD-609 649 DIV. 19

GAME THEORY
DIFFERENTIAL GAMES AND OPTIMAL PURSUIT-EVASION STRATEGIES.
AD-609 772 DIV. 19

•CAPACITORS
MANUFACTURING METHODS
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200C.
AD-609 639 DIV. 8

•CARBON DIOXIDE
ABSORPTION
STABILIZATION OF MONOETHANOLAMINE SOLUTIONS FOR SUBMARINE CARBON DIOXIDE SCRUBBERS.
AD-609 888 DIV. 31

DIFFUSION
MEASUREMENT AND PREDICTION OF DIFFUSIVITIES TO 1700K IN BINARY SYSTEMS CONTAINING CARBON DIOXIDE.
AD-609 597 DIV. 25

METERS
MODIFICATION OF THE RINGROSE CARBON DIOXIDE METER.
AD-609 881 DIV. 31

•CARBON
ROCKET MOTOR NOZZLES
CASTABLE CARBON FOR NOZZLE APPLICATIONS.
AD-609 607 DIV. 27

THERMODYNAMICS
THERMODYNAMIC PROPERTIES OF CARBON-NITROGEN MIXTURES AT HIGH TEMPERATURES.
AD-609 670 DIV. 25

•CARDIOVASCULAR DISEASES
DIAGNOSIS
QUANTITATIVE INTERPRETATION OF THE EXERCISE ELECTROCARDIOGRAM. USE OF COMPUTER TECHNIQUES IN THE CARDIAC EVALUATION OF AVIATION PERSONNEL.
AD-609 999 DIV. 16

•CASTINGS
POROSITY
EFFECT OF SOLIDIFICATION IMPERFECTIONS ON THE TENSILE PROPERTIES OF CAST STEEL.
AD-609 951 DIV. 17

VEHICLES
POTENTIAL OF CASTINGS IN FUTURE ARMY VEHICLES.
AD-609 671 DIV. 26

•CATHODE RAY TUBES
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
AD-609 843 DIV. 8

PRODUCTION
PRODUCTION ENGINEERING MEASURE ON HIGH PERVEANCE CATHODE-RAY TUBES.
AD-609 963 DIV. 8

STORAGE TUBES
RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES. PHASE II.
AD-609 749 DIV. 8

•CAVITATION
NOZZLES
CRITICAL PRESSURES FOR THE INCEPTION OF CAVITATION IN A LARGE-SCALE NUMACHI NOZZLE AS INFLUENCED BY THE AIR CONTENT OF THE WATER.
AD-609 629 DIV. 9

•CAVITY RESONATORS
PHONONS
SOME RECENT ADVANCES IN MICROWAVE PHONON GENERATION AND DETECTION WITH APPLICATIONS TO THE STUDY OF PHONON-LATTICE INTERACTIONS IN DIELECTRIC MATERIALS.
AD-609 979 DIV. 28

•CELESTIAL MECHANICS
SATELLITES (ARTIFICIAL)
AN ANALYTICAL STUDY OF THE EFFECTS OF OBLATENESS ON SATELLITE ORBITS.
AD-609 919 DIV. 12

•CENTER OF GRAVITY
ASTRONAUTS
MOMENTS OF INERTIA AND CENTERS OF GRAVITY OF THE LIVING HUMAN BODY ENCUMBERED BY A FULL-PRESSURE SUIT.
AD-609 863 DIV. 16

•CERAMIC CAPACITORS
FLUORINATION
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200C.
AD-609 639 DIV. 8

•CERAMIC MATERIALS
CASTING
SLIP-CAST FUSED SILICA.
AD-609 667 DIV. 12

CRYSTALS
DIFFUSION STUDIES IN CERAMIC CRYSTALS.
AD-609 726 DIV. 25

ELECTRONIC EQUIPMENT
PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
AD-609 686 DIV. 8

•CERAMICS MATERIALS
WEAPONS
CERAMICS! THEIR ROLE IN WEAPONRY.
AD-609 696 DIV. 19

•CESIUM ELECTRON TUBES
MICROWAVE OSCILLATORS
ATOMIC OSCILLATOR DEVICE FOR NAVIGATION-GUIDANCE.
AD-609 776 DIV. 8

•CESIUM
THERMAL RADIATION
THERMAL EMISSION OF NEUTRAL CESIUM.
AD-609 984 DIV. 25

•CHARGED PARTICLES
RELATIVITY THEORY
BASIC EQUATIONS OF THE RELATIVISTIC TEST PARTICLE PROBLEM.
AD-609 590 DIV. 25

•CHEMICAL BONDS
VIBRATION
VIBRATIONAL LEVELS IN LIQUID BROMINE BY NEUTRON INELASTIC SCATTERING.
AD-609 678 DIV. 20

•CHEMICAL WARFARE
ARMED FORCES RESEARCH
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES.
AD-609 804 DIV. 3
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES, VOLUME I.
AD-609 805 DIV. 3
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES. VOLUME II.
AD-609 806 DIV. 3

•CHEMISTRY
REVIEWS
CHEMISTRY PROGRAM REVIEW, FISCAL YEAR 1964.
AD-609 879 DIV. 4

•CHEMOTHERAPY
DIFFERENTIAL EQUATIONS
NUMERICAL INTEGRATION OF A DIFFERENTIAL-DIFFERENCE EQUATION WITH A DECREASING TIME-LAG.
AD-609 835 DIV. 19

•CHLORINE COMPOUNDS
AROMATIC COMPOUNDS
SYNTHESIS AND PROPERTIES OF ALKYLAROMATIC CHLOROCARBONS.
AD-609 969 DIV. 4

•CHLORINE
VOLUMETRIC ANALYSIS
DETERMINATION OF CHLORINE AND IONIC CHLORIDE IN ORGANIC COMPOUNDS.
AD-609 650 DIV. 4

•CHROMIUM ALLOYS
ELECTRODEPOSITION
ELECTRODEPOSITION OF CHROMIUM ALLOYS. A LITERATURE REVIEW.
AD-609 691 DIV. 26

•CIVIL DEFENSE SYSTEMS
HOUSING
HISTORICAL INCIDENTS OF EXTREME OVERCROWDING FOR POSSIBLE ANALOGY TO CIVIL DEFENSE SHELTERS.
AD-609 792 DIV. 32

SHELTERS
DESIGN AND PERFORMANCE OF A FALLOUT-TESTED MANNED SHELTER STATION AND ITS SUITABILITY AS A SINGLE-FAMILY SHELTER.
AD-609 734 DIV. 18

TRAINING
OCCUPANCY EXERCISE RESEARCH GUIDE! AN INTRODUCTION TO THE RESEARCH USE OF THE SHELTER EXERCISE FOR TRAINING.
AD-609 980 DIV. 18

•CLOUD COVER
ALBEDO (ASTRONOMY)
ANALYSIS OF DAYTIME RADIATION DATA FROM TIROS IV.
AD-609 767 DIV. 2

•CODING
ERRORS
ERROR CONTROL THROUGH CODING. ANALYSIS AND COMPARISON OF ERROR CONTROL TECHNIQUES.
AD-609 466 DIV. 8
ERROR CONTROL THROUGH CODING. RECURRENT BURST-ERRORCORRECTING CODES.
AD-609 467 DIV. 8
ERROR CONTWOL THROUGH CODING. THE DESIGN OF ERROR CONTROL SYSTEMS.
AD-609 468 DIV. 8
ERROR CONTROL THROUGH CODING. VARIABLE REDUNDANCY CODES.
AD-609 470 DIV. 8
ERROR CONTROL THROUGH CODING! SUMMARY OF RESULTS.
AD-609 471 DIV. 8
ERROR CONTROL THROUGH CODING. RESIDUE CODES.
AD-609 472 DIV. 8
ERROR CONTROL THROUGH CODING. ADAPTIVE ERROR CONTROL SYSTEMS.
AD-609 473 DIV. 8
ERROR CONTROL THROUGH CODING. EXPERIMENTAL VERIFICATION AND OTHER STUDIES.
AD-609 474 DIV. 8

•COLLOIDS
GAS FLOW
DYNAMICS OF GAS-PARTICLE MIXTURES WITH FINITE PARTICLE VOLUME.
AD-609 598 DIV. 9

REFRACTION
USE OF DOUBLY REFRACTING SOLUTIONS IN THE INVESTIGATION OF FLUID FLOW PHENOMENA.
AD-609 632 DIV. 9

•COLUMBIA
HANDBOOKS
U. S. ARMY AREA HANDBOOK FOR COLOMBIA.
AD-609 996 DIV. 32

•COMBAT INFORMATION CENTERS
STRATEGIC AIR COMMAND
DATA DISPLAY CENTRAL GROUP DISPLAY CHAIN AND ELECTRONIC DATA TRANSMISSION COMMUNICATIONS CENTRAL.
AD-609 773 DIV. 5

•COMMAND AND CONTROL SYSTEMS
AIR FORCE
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME III. ANALYSIS OF SERIAL AND PARALLEL FILE STRUCTURES.
AD-609 765 DIV. 18

AIR DEFENSE COMMAND
THE ROLE OF SIMULATION AND DATA REDUCTION PROGRAMS IN THE DEVELOPMENT OF REAL-TIME SYSTEMS.
AD-609 900 DIV. 30

AIR FORCE
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME I. SIMULATION OF 473L SYSTEM OVER A RANGE OF OPERATING CONDITIONS.
AD-609 763 DIV. 18
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME II. SIMCOM AND SIMSCRIPT SIMULATION TECHNIQUES! A COMPARISON.
AD-609 764 DIV. 18

DATA PROCESSING SYSTEMS
THOMPSON-RAMO-WOODRIDGE TWO-STATION, ON-LINE SCIENTIFIC COMPUTER.
AD-609 720 DIV. 30

STRATEGIC AIR COMMAND
DATA DISPLAY CENTRAL GROUP DISPLAY CHAIN AND ELECTRONIC DATA TRANSMISSION COMMUNICATIONS CENTRAL.
AD-609 773 DIV. 5

•COMMUNICATION EQUIPMENT
MICROWAVE EQUIPMENT
MODIFICATIONS MADE TO THE USAF TRANSPORTABLE PASSIVE SATELLITE COMMUNICATIONS TERMINAL.
AD-609 809 DIV. 8

•COMMUNICATION SATELLITES (ACTIVE)
ANTENNAS
DESIGN APPROACHES FOR SATELLITE ANTENNAS.
AD-609 616 DIV. 8

•COMMUNICATION SYSTEMS
CODING
ERROR CONTROL THROUGH CODING. ANALYSIS AND COMPARISON OF ERROR CONTROL TECHNIQUES.
AD-609 466 DIV. 8
ERROR CONTROL THROUGH CODING. RECURRENT BURST-ERRORCORRECTING CODES.
AD-609 467 DIV. 8
ERROR CONTROL THROUGH CODING. THE DESIGN OF ERROR CONTROL SYSTEMS.
AD-609 468 DIV. 8
ERROR CONTROL THROUGH CODING. VARIABLE REDUNDANCY CODES.
AD-609 470 DIV. 8
ERROR CONTROL THROUGH CODING! SUMMARY OF RESULTS.
AD-609 471 DIV. 8
ERROR CONTROL THROUGH CODING. RESIDUE CODES.
AD-609 472 DIV. 8
ERROR CONTROL THROUGH CODING. ADAPTIVE ERROR CONTROL SYSTEMS.
AD-609 473 DIV. 8
ERROR CONTROL THROUGH CODING. EXPERIMENTAL VERIFICATION AND OTHER STUDIES.
AD-609 474 DIV. 8

•COMMUNICATION THEORY
DEMODULATION
INVESTIGATIONS OF ADAPTIVE DETECTION TECHNIQUES.
AD-609 799 DIV. 8

NETWORKS
EFFICIENCY OF A ROUTING SCHEME IN A MOBILE DATA PROCESSING COMMUNICATION NETWORK.
AD-609 774 DIV. 8

UNDERWATER SOUND SIGNALS
COMMUNICATION CHARACTERISTICS OF AN UNDERWATER ACOUSTIC SIGNAL REFLECTED FROM A SPACE AND TIME RANDOM SURFACE.
AD-609 627 DIV. 5

•COMPILERS
PROGRAMMING LANGUAGES
TECHNIQUES FOR AUTOMATING THE CONSTRUCTION OF TRANSLATORS (ASSEMBLERS, INTERPRETERS, COMPILERS) FOR PROGRAMMING LANGUAGES.
AD-609 487 DIV. 30

•COMPLEX VARIABLES
ANALOG COMPUTERS
ANALOG COMPUTER TECHNIQUES FOR PROBLEMS IN COMPLEX VARIABLES.
AD-609 733 DIV. 30

TOPOLOGY
AN IMBEDDING OF CLOSED RIEMANN SURFACES IN EUCLIDEAN SPACE.
AD-609 866 DIV. 19

•COMPOSITE MATERIALS
FILAMENT WOUND CONSTRUCTION
RESIDUAL STRESSES IN THICK GLASS FILAMENT REINFORCED LAMINATES.
AD-609 610 DIV. 14
OPTIMUM FILAMENT DIAMETERS FOR STRUCTURAL COMPOSITE FOR DEEP SUBMERSIBLES.
AD-609 695 DIV. 31
FILAMENT-WINDING PLASTICS. PART 2. ROLE OF THE RESIN IN GLASS-FIBER-REINFORCED STRUCTURES UNDER TENSILE STRESS.
AD-609 770 DIV. 14

GLASS TEXTILES
GLASS/RESIN INTERFACE: PATENT SURVEY, PATENT LIST, AND GENERAL BIBLIOGRAPHY.
AD-609 926 DIV. 14

PRESSURE VESSELS
ANALYSIS OF GLASS REINFORCED PLASTICS FOR HYDROSPACE APPLICATIONS.
AD-609 708 DIV. 14

RESISTORS
PRECISION VOLUME RESISTOR.
AD-609 623 DIV. 8

•COMPRESSIVE PROPERTIES
RINGS
STUDIES ON THE INSTABILITY OF CIRCULAR RINGS.
AD-609 503 DIV. 13

•COMPUTER PERSONNEL
MEMORY
HUMAN USE OF SHORT TERM MEMORY IN PROCESSING INFORMATION ON A CONSOLE.
AD-609 749 DIV. 30

•COMPUTER STORAGE DEVICES
DIGITAL COMPUTERS
CRYOELECTRIC RANDOM ACCESS MEMORY, PHASE II, 10(9) BIT MEMORY.
AD-609 469 DIV. 30

HUMAN ENGINEERING
HUMAN USE OF SHORT TERM MEMORY IN PROCESSING INFORMATION ON A CONSOLE.
AD-609 749 DIV. 30

•COMPUTERS
DATA PROCESSING SYSTEMS
THOMPSON-RAMO-WOODRIDGE TWO-STATION, ON-LINE SCIENTIFIC COMPUTER.
AD-609 720 DIV. 30

PROGRAMMING (COMPUTERS)
ATTRIBUTE DERIVATION AND DISPLAY SYSTEM FOR THE EXPERIMENTAL DYNAMIC PROCESSOR.
AD-609 488 DIV. 30

•CONFINED ENVIRONMENTS
GROUP DYNAMICS
STRUCTURAL CHANGE IN SMALL ISOLATED GROUPS.
AD-609 543 DIV. 28

•CONTAINERS
MARKERS
DEVELOPMENT AND EVALUATION OF POLYSTYRENE FOAM CONTAINER FOR MK 46 TYPE SUBMARINE SIGNALS.
AD-609 647 DIV. 26

SANDWICH CONSTRUCTION
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 867 DIV. 26
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 868 DIV. 26
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 871 DIV. 26

•CONTINUUM MECHANICS
THEOREMS
EXTENDED DISPLACEMENT ROUND THEOREMS FOR WORK HARDENING CONTINUA SUBJECTED TO IMPULSIVE LOADING.
AD-609 760 DIV. 28

•CONTROL SYSTEMS
OPTIMIZATION
ALGORITHM FOR SOLVING VOLTERRA INTEGRAL EQUATIONS MET IN PROCESS IDENTIFICATION.
AD-609 869 DIV. 19

THEORY
RESEARCH INVESTIGATIONS IN SYSTEMS THEORY.
AD-609 450 DIV. 30

•COPOLYMERIZATION
THEORY
STUDIES IN IONIC COPOLYMERIZATION.
AD-609 497 DIV. 4

•COPPER
TENSILE PROPERTIES
THE EFFECT OF SPECIMEN GEOMETRY ON DETERMINATION OF ELONGATION IN SHEET TENSILE SPECIMENS.
AD-609 689 DIV. 17

•CORRELATION TECHNIQUES
MATRIX ALGEBRA
LATENT STRUCTURE FOR THE SIMPLEX: PSYCHOMETRIC METHODS.
AD-609 676 DIV. 28

•CORROSION
TROPICAL TESTS
CORROSION OF METALS IN TROPICAL ENVIRONMENTS. PART 6. ALUMINUM AND MAGNESIUM.
AD-609 618 DIV. 17

UNDERGROUND STRUCTURES
CORROSION INVESTIGATIONS, TRACY-RED, CALIFORNIA, EHV DIRECT-CURRENT TESTS.
AD-609 766 DIV. 17

•CRATERING
HYPERVELOCITY PROJECTILES
CRATERING PRODUCED IN METALS BY HIGH-VELOCITY IMPACT.
AD-609 641 DIV. 22

METEORS
PENETRATION AND CRATERING.
AD-609 642 DIV. 12

•CROSSED FIELD DEVICES
ELECTRON BEAMS
THE DIOCOTRON INSTABILITY IN A CYLINDRICAL GEOMETRY.
AD-609 638 DIV. 8

•CRYOGENIC STORAGE DEVICES
MANUFACTURING METHODS
CRYOELECTRIC RANDOM ACCESS MEMORY, PHASE II, 10(9) BIT MEMORY.
AD-609 469 DIV. 30

•CRYOGENICS
CHEMICAL REACTIONS
STUDIES OF LOW-TEMPERATURE OXIDATION REACTIONS.
AD-609 800 DIV. 4

MATERIALS
CRYOGENIC MATERIALS DATA HANDBOOK.
AD-609 562 DIV. 25

•CRYSTAL FILTERS
MANUFACTURING METHODS
PEM QUARTZ CRYSTAL UNITS, FILTER LOW FREQUENCY, 1MC TO 10MC TYPES CR-(XM-49)/U THRU CR-(XM-92)/U.
AD-609 463 DIV. 8
UPPER-SIDEBAND (1.75-MC) QUARTZ CRYSTAL FILTER TYPE EL-FR (X-1): PRODUCTION ENGINEERING MEASURE.
AD-609 716 DIV. 8

•CRYSTAL LATTICES
IONS
RARE EARTH IONS IN CRYSTALLINE FIELDS.
AD-609 541 DIV. 20

•CRYSTALS
DIFFUSION
DIFFUSION STUDIES IN CERAMIC CRYSTALS.
AD-609 726 DIV. 25

OPTICAL PROPERTIES
AD-609 847 DIV. 25

REFLECTION
INFRARED COATING STUDIES: RESTSTRAHLEN ENHANCEMENT OF FLUORIDE CRYSTALS.
AD-609 779 DIV. 14

•CYBERNETICS
EDUCATION
MODEL AND CYBERNETIC SYSTEM FOR RESEARCH ON THE TEACHING-LEARNING PROCESS.
AD-609 540 DIV. 23

SYMPOSIA
APPLICATIONS OF A DIGITAL-COMPUTER SIMULATION OF A NEURAL NETWORK.
AD-609 681 DIV. 30

•CYLINDRICAL BODIES
ACOUSTICS
APPROXIMATION TO RELATION BETWEEN CROSS SPECTRAL DENSITY OF THE MEAN-SQUARE, FAR-FIELD PRESSURE SURROUNDING A SOUND SOURCE.
AD-609 634 DIV. 25
RANDOM LOADING AND RADIATION FROM STIFFENED AND SANDWICH TYPE CYLINDRICAL SHELL STRUCTURES. PART II, UNSYMMETRICAL LOADING WITH KNOWN SPACE DISTRIBUTION.
AD-609 636 DIV. 25

BUCKLING (MECHANICS)
BUCKLING CHARACTERISTICS OF THIN CYLINDRICAL SHELLS SUBJECTED TO AXIAL COMPRESSION AND INTERNAL PRESSURE.
AD-609 688 DIV. 25

CROSSED FIELD DEVICES
THE DIOCOTRON INSTABILITY IN A CYLINDRICAL GEOMETRY.
AD-609 638 DIV. 8

FLUID FLOW
SEPARATION IN NON-UNIFORM SHEAR FLOW.
AD-609 778 DIV. 9

STRUCTURAL SHELLS
THE STRESSES IN A CYLINDRICAL SHELL CONTAINING AN AXIAL CRACK.
AD-609 669 DIV. 25

•CYPRUS
HANDBOOKS
U. S. ARMY AREA HANDBOOK FOR CYPRUS.
AD-609 548 DIV. 32

•DATA PROCESSING SYSTEMS
COMMAND AND CONTROL SYSTEMS
THE ROLE OF SIMULATION AND DATA REDUCTION PROGRAMS IN THE DEVELOPMENT OF REAL-TIME SYSTEMS.
AD-609 900 DIV. 30
THOMPSON-RAMO-WOODRIDGE TWO-STATION, ON-LINE SCIENTIFIC COMPUTER.
AD-609 720 DIV. 30
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME I. SIMULATION OF 473L SYSTEM OVER A RANGE OF OPERATING CONDITIONS.
AD-609 769 DIV. 18
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME II. SIMCOM AND SIMSCRIPT SIMULATION TECHNIQUES: A COMPARISON.
AD-609 769 DIV. 18

SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME III. ANALYSIS OF SERIAL AND PARALLEL FILE STRUCTURES.
AD-609 769 DIV. 18

METEOROLOGICAL RADAR
STORM RADAR DATA PROCESSOR EVALUATION.
AD-609 820 DIV. 2

MOBILE
EFFICIENCY OF A ROUTING SCHEME IN A MOBILE DATA PROCESSING COMMUNICATION NETWORK.
AD-609 774 DIV. 8

SEISMOLOGY
AUTOMATED BULLETIN AND SEISMIC DATA RETRIEVAL SYSTEM.
AD-609 928 DIV. 2

•DATA TRANSMISSION SYSTEMS
STRATEGIC AIR COMMAND
DATA DISPLAY CENTRAL GROUP DISPLAY CHAIN AND ELECTRONIC DATA TRANSMISSION COMMUNICATIONS CENTRAL.
AD-609 773 DIV. 5

•DECISION THEORY
LINEAR PROGRAMMING
MINIMUM NUMBER OF LINEAR DECISION FUNCTIONS TO IMPLEMENT A DECISION PROCESS.
AD-609 476 DIV. 15

MATHEMATICAL LOGIC
PREFERENCE, CREDENCE, AND UTILITY.
AD-609 560 DIV. 15

QUALITY CONTROL
MARKOVIAN DECISION MODELS FOR REJECT ALLOWANCE PROBLEMS.
AD-609 677 DIV. 26

•DECONTAMINATION
BIOLOGICAL WARFARE AGENTS
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES.
AD-609 804 DIV. 3
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES, VOLUME I.
AD-609 805 DIV. 3
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES. VOLUME II.
AD-609 806 DIV. 3

•DEFENSE SYSTEMS
INSTALLATION
SYSTEM INSTALLATION AND TESTING.
AD-609 477 DIV. 18

•DELAY LINES
PHOTOELASTICITY
MULTIPLE TAPPED PHOTOELASTIC DELAY LINE.
AD-609 579 DIV. 25

•DEMODULATION
ELECTROMAGNETIC PULSES
INVESTIGATIONS OF ADAPTIVE DETECTION TECHNIQUES.
AD-609 799 DIV. 8

•DEPARTMENT OF DEFENSE
ARMED FORCES PROCUREMENT
SUPPLEMENT TO 'MANAGEMENT OF VALUE ENGINEERING PROGRAMS IN DEFENSE CONTRACTS': INSTRUCTOR'S NOTES FOR CASE PROBLEMS IN THE CONTRACTUAL ASPECTS OF VALUE ENGINEERING.
AD-609 883 DIV. 18
SUPPLEMENT TO 'MANAGEMENT OF VALUE ENGINEERING PROGRAMS IN DEFENSE CONTRACTS': TRAINING AIDS: DESCRIPTION AND FORMAT.
AD-609 884 DIV. 18

COSTS
VALUE ANALYSIS (VALUE NGINEERING). A TECHNIQUE FOR OBTAINING MORE VALUE FOR THE DEFENSE DOLLAR.
AD-609 920 DIV. 18

•DETECTION
BIOPHYSICS
BIOSENSING TECHNICS FOR HUMAN DETECTION: THE FROG SKIN TRANSDUCER.
AD-609 436 DIV. 6

•DIATOMIC MOLECULES
EXCITATION
DISTORTED WAVE CALCULATION OF ROTATIONAL EXCITATION OF N2 BY SLOW ELECTRONS.
AD-609 837 DIV. 25

•DIELECTRICS
PHONONS
SOME RECENT ADVANCES IN MICROWAVE PHONON GENERATION AND DETECTION WITH APPLICATIONS TO THE STUDY OF PHONON-LATTICE INTERACTIONS IN DIELECTRIC MATERIALS.
AD-609 479 DIV. 25

•DIFFERENCE EQUATIONS
DIFFERENTIAL EQUATIONS
NUMERICAL INTEGRATION OF A DIFFERENTIAL-DIFFERENCE EQUATION WITH A DECREASING TIME-LAG.
AD-609 835 DIV. 15

NUMERICAL ANALYSIS
A LAGRANGIAN FINITE DIFFERENCE METHOD FOR TWO-DIMENSIONAL MOTION INCLUDING MATERIAL STRENGTH.
AD-609 523 DIV. 25

•DIFFERENTIAL EQUATIONS
INTEGRATION
TRANSLATION OF RUMANIAN RESEARCH: RUNGE-KUTTA TYPE PROCEDURES OF ORDER OF ACCURACY N 4 (N > 2) WITH THREE NODES FOR NUMERICAL INTEGRATION OF FIRST-ORDER DIFFERENTIAL EQUATIONS.
AD-609 692 DIV. 15

NUMERICAL ANALYSIS
TRANSLATION OF RUSSIAN RESEARCH: THEORY OF ERROR OF THE RUNGE-KUTTA METHOD.
AD-609 656 DIV. 15
NUMERICAL INTEGRATION OF A DIFFERENTIAL-DIFFERENCE EQUATION WITH A DECREASING TIME-LAG.
AD-609 835 DIV. 15

STOCHASTIC PROCESSES
ON THE RELATION BETWEEN ORDINARY AND STOCHASTIC DIFFERENTIAL EQUATIONS.
AD-609 826 DIV. 15

•DIFFERENTIAL GEOMETRY
THEORY
ABSOLUTE EQUIVALENCE OF EXTERIOR DIFFERENTIAL SYSTEMS.
AD-609 687 DIV. 15

•DIFFUSION
CERAMIC MATERIALS
DIFFUSION STUDIES IN CERAMIC CRYSTALS.
AD-609 726 DIV. 25

GAS FLOW
LINEARIZED ANALYSIS OF UNSTEADY, REACTING FLOWS WITH BODY FORCES.
AD-609 574 DIV. 9

NIOBIUM ALLOYS
DIFFUSION IN COLUMBIUM RICH COLUMBIUM-TITANIUM ALLOYS WITH CONSIDERATION OF THE POSSIBILITY THAT THE DIFFUSION COEFFICIENT IS TIME DEPENDENT.
AD-609 870 DIV. 17

•DIGITAL COMPUTERS
SIMULATION
APPLICATIONS OF A DIGITAL-COMPUTER SIMULATION OF A NEURAL NETWORK.
AD-609 681 DIV. 30

•DIGITAL RECORDING SYSTEMS
RADAR REFLECTIONS
RADAR DATA MEASURING SYSTEM FOR AIRCRAFT SIGNAL ENERGY RETURNS.
AD-609 497 DIV. 19

•DIODES (SEMICONDUCTOR)
LASERS
SEMICONDUCTOR LASER AMPLIFIER TECHNIQUES (SEMLAM).
AD-609 704 DIV. 25

PRODUCTION
PRODUCTION ENGINEERING MEASURE: MECHANIZATION OF SEMICONDUCTOR DEVICES.
AD-609 522 DIV. 8

•DIPOLE ANTENNAS
UNDERWATER
DYNAMIC ELECTRICAL MODELING OF ELECTRODES MOVING IN SEA WATER.
AD-60[illegible] 717 DIV. 8

•DISPLAY SYSTEMS
COMPUTERS
ATTRIBUTE DERIVATION AND DISPLAY SYSTEM FOR THE EXPERIMENTAL DYNAMIC PROCESSOR.
AD-609 488 DIV. 30

FLIGHT INSTRUMENTS
JANAIR: JOINT ARMY-NAVY AIRCRAFT INSTRUMENTATION RESEARCH. ANALYSIS OF PICTORIAL DISPLAYS.
AD-609 762 DIV. 1

STORAGE TUBES
RESEARCH AND DEVELOPMENT OF TWO-COLOR DIRECT VIEW STORAGE TUBE WITH SELECTIVE ERASURE.
AD-609 491 DIV. 8

•DYNAMIC PROGRAMMING
CALCULUS OF VARIATIONS
A DYNAMIC PROGRAMMING APPROACH TO THE NONPARAMETRIC PROBLEM IN THE CALCULUS OF VARIATIONS.
AD-609 649 DIV. 15

•EARTH
HEAT TRANSFER
VERTICAL FLUXES WITHIN THE VEGETATIVE CANOPY OF A CORN FIELD.
AD-609 740 DIV. 2

•EAR
HISTOLOGY
COMPARATIVE HISTOLOGICAL STUDY OF THE REINFORCED AREA OF THE SACCULAR MEMBRANE IN MAMMALS.
AD-609 443 DIV. 16

•ECONOMICS
AFRICA
BOOK REVIEW FOR 'AFRIC REPORT' ON 'ECONOMIC TRA NSITION IN AFRICA', EDITED BY M. J. HERSKOVITS AND M. HARWITZ (EVANSTON, NORTHWESTERN UNIV. PRESS, 1964).
AD-609 680 DIV. 32

GAME THEORY
VALUES OF LARGE GAMES- VII: A GENERAL EXCHANGE ECONOMY WITH MONEY.
AD-609 648 DIV. 32

INDEXES
ECONOMICS DEPARTMENT PUBLICATIONS, 1959-1964: AN AUTHOR INDEX OF THE OPEN LITERATURE, WITH ABSTRACTS.
AD-609 873 DIV. 32

SOUTHEAST ASIA
NATIONAL PRIORITIES AND DEVELOPMENT STRATEGIES IN SOUTHEAST ASIA.
AD-609 660 DIV. 32

•EDUCATION
PROGRAMMING (COMPUTERS)
A DESCRIPTIVE LIST OF PLATO LESSON PROGRAMS, 1960-1964.
AD-609 699 DIV. 23

•ELASTIC SHELLS
STRESSES
THE STRESSES IN A CYLINDRICAL SHELL CONTAINING AN AXIAL CRACK.
AD-609 669 DIV. 25

•ELASTICITY
MECHANICAL WAVES
TRANSIENT REPSONSE OF A RIGID SPHERICAL INCLUSION IN AN ELASTIC MEDIUM.
AD-609 850 DIV. 25

•ELECTRIC FIELDS
EARTH
VERTICAL ELECTRIC DIPOLE IN A TWO CONDUCTOR REGION.
AD-609 685 DIV. 2

•ELECTRIC PROPULSION
MAGNETOHYDRODYNAMICS
INDUCTIVE PLASMA ACCELERATION RESEARCH.
AD-609 728 DIV. 27

PLASMA ENGINES
SPACE PROPULSION BY PLASMA ACCELERATION TECHNIQUES.
AD-609 833 DIV. 27

•ELECTRICAL CONDUCTANCE
PROBES (ELECTROMAGNETIC)
CONDUCTIVITY MEASUREMENTS IN DISSIPATIVE MEDIA WITH ELECTRICALLY SHORT PROBES.
AD-609 684 DIV. 2

ROCK (GEOLOGY)
INVESTIGATIONS OF ELECTRICAL CHARACTERISTICS OF THE SUB SURFACE ROCK MEDIUM IN ESSEX COUNTRY, NEW YORK.
AD-609 683 DIV. 2

•ELECTRICAL NETWORKS
GATES (CIRCUITS)
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 705 DIV. 8
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 745 DIV. 8

MATHEMATICAL MODELS
STATE MODELS OF ACTIVE RLC NETWORKS.
AD-609 700 DIV. 8

•ELECTRODEPOSITION
CHROMIUM ALLOYS
ELECTRODEPOSITION OF CHROMIUM ALLOYS. A LITERATURE REVIEW.
AD-609 691 DIV. 26

•ELECTRODES
LOW-TEMPERATURE RESEARCH
LOW TEMPERATURE CYCLING BEHAVIOR OF THE SILVER ELECTRODE.
AD-609 876 DIV. 7

MODELS (SIMULATIONS)
DYNAMIC ELECTRICAL MODELING OF ELECTRODES MOVING IN SEA WATER.
AD-609 717 DIV. 8

•ELECTROENCEPHALOGRAPHY
MATHEMATICAL ANALYSIS
QUANTITATIVE INTERPRETATION OF THE EXERCISE ELECTROCARDIOGRAM. USE OF COMPUTER TECHNIQUES IN THE CARDIAC EVALUATION OF AVIATION PERSONNEL.
AD-609 999 DIV. 16

•ELECTROMAGNETIC FIELDS
NON-DESTRUCTIVE TESTING
ELECTROMAGNETIC TEST CONTROL REQUIREMENTS.
AD-609 938 DIV. 30

•ELECTROMAGNETIC PULSES
MONITORS
INVESTIGATIONS OF ADAPTIVE DETECTION TECHNIQUES.
AD-609 799 DIV. 8

•ELECTROMAGNETIC WAVES
ANGLE OF ARRIVAL
PROCEEDINGS OF THE TROPOSPHERIC REFRACTION EFFECTS MEETING (NO. 3). VOLUME 1. RESULTS AND STATUS OF TROPOSPHERIC-EFFECTS MEASUREMENT PROGRAM.
AD-609 731 DIV. 8

EXTREMELY LOW FREQUENCY
EXPERIMENTAL RESEARCH INVESTIGATION OF EXTREMELY LOW FREQUENCY PROPAGATION.
AD-609 719 DIV. 8

MICROMETEOROLOGY
RADIATIVE ENERGY EXCHANGE OVER ARCTIC LAND AND SEA.
AD-609 983 DIV. 2

PHASE DISTORTION
EFFECTS OF MISMATCH AND DISTORTION ON THE OUTPUT SIGNAL OF A LINEAR FM PULSE-COMPRESSION FILTER.
AD-609 978 DIV. 8

SCATTERING
THE BORN APPROXIMATION APPLIED TO ELECTROMAGNETIC SCATTERING FROM A FINITE CONE.
AD-609 724 DIV. 25

•ELECTROMAGNETISM
BOUNDARY VALUE PROBLEMS
ON ANALYTIC CONTINUATION OF A CLOSED REGION SOLUTION TO AN OPEN REGION.
AD-609 857 DIV. 8

•ELECTRON ACCELERATORS
NUCLEAR SCATTERING
LINEAR ELECTRON ACCELERATOR PROJECT.
AD-609 987 DIV. 20

•ELECTRON BEAMS
STABILITY
THE DIOCOTRON INSTABILITY IN A CYLINDRICAL GEOMETRY.
AD-609 638 DIV. 8

•ELECTRON GUNS
PROGRAMMING (COMPUTERS)
DIGITAL COMPUTER STUDIES OF ELECTRON GUNS.
AD-609 679 DIV. 8

•ELECTRON MICROSCOPY
FIELD EMISSION
FIELD ION MICROSCOPY OF IRON WHISKERS.
AD-609 859 DIV. 17

•ELECTRON OPTICS
INTEGRATED CIRCUITS
OPTOELECTRONIC FUNCTIONAL ELECTRONIC BLOCKS.
AD-609 909 DIV. 8

•ELECTRON TUBES
GAS DISCHARGES
EFFECT OF MAGNETIC FIELDS ON MICROWAVE GAS-DISCHARGE DUPLEXER CHARACTERISTICS.
AD-609 658 DIV. 8

•ELECTRONIC EQUIPMENT
CERAMIC MATERIALS
PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
AD-609 686 DIV. 8

•ELECTRONIC SWITCHES
MICROWAVE EQUIPMENT
FAST HIGH POWER MICROWAVE SWITCHES. A SURVEY.
AD-609 655 DIV. 8

•ELECTRONICS
RESEARCH PROGRAM ADMINISTRATION
ELECTRONICS RESEARCH PROGRAM. RESEARCH AND EXPERIMENTATION ON SPACE APPLICATIONS OF MILLIMETER WAVES.
AD-609 594 DIV. 8

•ELECTRONS
INELASTIC SCATTERING
DISTORTED WAVE CALCULATION OF ROTATIONAL EXCITATION OF N2 BY SLOW ELECTRONS.
AD-609 837 DIV. 25

SCATTERING
LINEAR ELECTRON ACCELERATOR PROJECT.
AD-609 987 DIV. 20

SPECTROSCOPY
EFFECT OF ADDED ELECTROLYTES OF THE E. S. R. AND OPTICAL ABSORPTION OF METAL-AMMONIA SOLUTIONS.
AD-609 557 DIV. 4

•ELECTROPHOTOGRAPHY
AERIAL CAMERAS
RESEARCH AND DEVELOPMENT ON PHOTOCONDUCTIVE PHOTOTAPE.
AD-609 768 DIV. 24

•ELECTROSTATICS
MAGNETOHYDRODYNAMICS
INDUCTIVE PLASMA ACCELERATION RESEARCH.
AD-609 728 DIV. 27

•ELLIPSOIDS
STATISTICAL ANALYSIS
REAL TIME COMPUTATION OF CONFIDENCE ELLIPSOIDS.
AD-609 601 DIV. 15

•EPOXY PLASTICS
FILAMENT WOUND CONSTRUCTION
FILAMENT-WINDING PLASTICS. PART 2. ROLE OF THE RESIN IN GLASS-FIBER-REINFORCED STRUCTURES UNDER TENSILE STRESS.
AD-609 770 DIV. 14

•EROSION
MASSACHUSETTS
EROSION OF THE CLIFFS OF OUTER CAPE COD: TABLES AND GRAPHS.
AD-609 839 DIV. 2

•ERRORS
CONTROL
ERROR CONTROL THROUGH CODING. ANALYSIS AND COMPARISON OF ERROR CONTROL TECHNIQUES.
AD-609 466 DIV. 8
ERROR CONTROL THROUGH CODING. RECURRENT BURST-ERRORCORRECTING CODES.
AD-609 467 DIV. 8
ERROR CONTROL THROUGH CODING. THE DESIGN OF ERROR CONTROL SYSTEMS.
AD-609 468 DIV. 8
ERROR CONTROL THROUGH CODING. VARIABLE REDUNDANCY CODES.
AD-609 470 DIV. 8
ERROR CONTROL THROUGH CODING: SUMMARY OF RESULTS.
AD-609 471 DIV. 8
ERROR CONTROL THROUGH CODING. RESIDUE CODES.
AD-609 472 DIV. 8
ERROR CONTROL THROUGH CODING. ADAPTIVE ERROR CONTROL SYSTEMS.
AD-609 473 DIV. 8
ERROR CONTROL THROUGH CODING. EXPERIMENTAL VERIFICATION AND OTHER STUDIES.
AD-609 474 DIV. 8

•ETHIOPIA
HANDBOOKS
U. S. ARMY AREA HANDBOOK FOR ETHIOPIA.
AD-609 549 DIV. 32

•EVAPORATORS
METAL FILMS
STRUCTURE AND STRENGTH OF EPITAXIAL FILMS.
AD-609 730 DIV. 29

•EXCITATION
NITROGEN
DISTORTED WAVE CALCULATION OF ROTATIONAL EXCITATION OF N2 BY SLOW ELECTRONS.
AD-609 837 DIV. 25

•EXHAUST GASES
PLASMA MEDIUM
ROLE OF ALUMINUM AND ITS OXIDES IN SOLID PROPELLANT EXHAUST.
AD-609 591 DIV. 10

REACTION KINETICS
KINETIC STUDY OF ROCKET EXHAUST GASES. STUDY OF RADIATION EMITTED BY MODIFIED AND UNMODIFIED PROPELLANT SYSTEM.
AD-609 600 DIV. 10

VELOCITY
THE EFFECT OF PROPELLANT ENERGY AND MASS DISTRIBUTION ON ROCKET PROPULSION EFFICIENCY.
AD-609 513 DIV. 27

•EXPANDED PLASTICS
STYRENE PLASTICS
DEVELOPMENT AND EVALUATION OF POLYSTYRENE FOAM CONTAINER FOR MK 66 TYPE SUBMARINE SIGNALS.
AD-609 647 DIV. 26

•EXPLODING WIRES
EFFECTIVENESS
INITIATION OF EXPLOSIVES BY EXPLODING WIRES. V. EFFECT OF WIRE MATERIAL ON THE INITIATION OF PETN BY EXPLODING WIRES.
AD-609 449 DIV. 22

•EXPLOSIVE MATERIALS
DETONATION WAVES
RESPONSE OF A THIN SHELL TO A SHOCK WAVE; DETONATION WAVES WITHIN A SPHERICAL SHELL.
AD-609 869 DIV. 22

•EXPLOSIVES INITIATORS
EXPLODING WIRES
INITIATION OF EXPLOSIVES BY EXPLODING WIRES. V. EFFECT OF WIRE MATERIAL ON THE INITIATION OF PETN BY EXPLODING WIRES.
AD-609 449 DIV. 22

•EXTRATERRESTRIAL RADIO WAVES
EXTREMELY LOW FREQUENCY
VERY LOW FREQUENCY ENVELOPE SPECTRA OF SOLAR RADIO BURSTS.
AD-609 861 DIV. 2

TERRESTRIAL MAGNETISM
A COLLATION STUDY OF A HIGHLY MAGNETIC PERIOD (SEPTEMBER 20-23, 1963).
AD-609 862 DIV. 2

•EXTREMELY LOW FREQUENCY
PROPAGATION
EXPERIMENTAL RESEARCH INVESTIGATION OF EXTREMELY LOW FREQUENCY PROPAGATION.
AD-609 719 DIV. 8

•EYE
ADAPTATION (PHYSIOLOGY)
RETINAL SENSITIVITY DURING PHOTOPIC ADAPTATION.
AD-609 511 DIV. 16

•FACTOR ANALYSIS
PERSONALITY
VARIABILITY IN FACTOR STRUCTURES OF CLINICIANS' PERSONALITY RATINGS.
AD-609 545 DIV. 28

•FERROCENES
PHYSICAL PROPERTIES
TRANSLATION OF RUSSIAN RESEARCH: ELECTRIC AND MAGNETIC PROPERTIES OF THERMALLY TREATED FERROCENE BASE POLYMERS.
AD-609 782 DIV. 4

•FERROELECTRIC CRYSTALS
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE: SPHERES OF YTTRIUM, IRON AND GARNET FOR FABRICATING POWER LIMITERS.
AD-609 661 DIV. 8

•FIBER OPTICS
DELAY LINES
MULTIPLE TAPPED PHOTOELASTIC DELAY LINE.
AD-609 579 DIV. 29

INFRARED RADIATION
LONG WAVELENGTH INFRARED FIBER OPTICS.
AD-609 842 DIV. 14

•FIELD EMISSION
ELECTRON MICROSCOPY
FIELD ION MICROSCOPY OF IRON WHISKERS.
AD-609 859 DIV. 17

•FIELD THEORY
BOUNDARY VALUE PROBLEMS
SOLUTIONS OF THE MAGNETOFLUID-DYNAMIC BOUNDARY-LAYER EQUATIONS FOR A FLAT PLATE WITH A MOVING TRANSVERSE MAGNETIC FIELD SOURCE OR CROSSED ELECTRIC FIELD IN THE SPANWISE DIRECTION.
AD-609 534 DIV. 9

NUMERICAL ANALYSIS
THE BORN APPROXIMATION APPLIED TO ELECTROMAGNETIC SCATTERING FROM A FINITE CONE.
AD-609 724 DIV. 29

TRANSDUCERS
TOROIDAL WAVE FUNCTIONS AND THEIR APPLICATION TO THE FREEFLOODING RING TRANSDUCER.
AD-609 529 DIV. 25

•FILAMENT WOUND CONSTRUCTION
COMPOSITE MATERIALS
RESIDUAL STRESSES IN THICK GLASS FILAMENT REINFORCED LAMINATES.
AD-609 610 DIV. 14
OPTIMUM FILAMENT DIAMETERS FOR STRUCTURAL COMPOSITE FOR DEEP SUBMERSIBLES.
AD-609 695 DIV. 31
FILAMENT-WINDING PLASTICS. PART 2. ROLE OF THE RESIN IN GLASS-FIBER-REINFORCED STRUCTURES UNDER TENSILE STRESS.
AD-609 770 DIV. 14

PRESSURE VESSELS
ANALYSIS OF GLASS REINFORCED PLASTICS FOR HYDROSPACE APPLICATIONS.
AD-609 708 DIV. 14

•FINS
VIBRATION
VIBRATION OF RECTANGULAR AND SKEW CANTILEVER PLATES REPRESENTING IDEALIZED MISSILE FINS.
AD-609 742 DIV. 12

•FIRE SAFETY
AIRCRAFT FIRES
STRUCTURAL DESIGN FOR FUEL CONTAINMENT UNDER SURVIVABLE CRASH CONDITIONS.
AD-609 615 DIV. 1

•FISHES
MEXICO GULF
MARINE ICHTHYOFAUNA OF ST. ANDREW BAY, FLORIDA, AND NEARSHORE HABITATS OF THE NORTHEASTERN GULF OF MEXICO.
AD-609 715 DIV. 2

•FISSION PRODUCTS
ABSORPTION
CONSEQUENCES OF INGESTION BY MAN OF REAL AND SIMULATED FALLOUT.
AD-609 624 DIV. 16

•FIXED RESISTORS
METAL FILMS
PRODUCTION ENGINEERING MEASURES FOR HIGH RELIABILITY, FIXED, FILM, PRECISION RESISTORS.
AD-609 602 DIV. 8

•FLAMES
IONIZATION
STUDIES TO DETERMINE THE MECHANISM OF PRODUCTION AND REMOVAL OF ELECTRONS IN FLAMES.
AD-609 515 DIV. 10

•FLARED AFTERBODIES
AERODYNAMIC CHARACTERISTICS
LAMINAR BOUNDARY-LAYER SEPARATION ON FLARED BODIES AT SUPERSONIC AND HYPERSONIC SPEEDS.
AD-609 841 DIV. 9

•FLAT PLATE MODELS
AERODYNAMIC CHARACTERISTICS
PRESSURE MEASUREMENTS FOR MACH 8 FLOWS OVER EXPANSION CORNERS AND RAMPS ON AN INTERNALLY COOLED MODEL. PART II. FLOWS OVER A FLAT PLATE WITH AND WITHOUT A PARTIAL SPAN RAMP. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS.
AD-609 458 DIV. 9

FLUID FLOW
SOLUTIONS OF THE MAGNETOFLUID-DYNAMIC BOUNDARY-LAYER EQUATIONS FOR A FLAT PLATE WITH A MOVING TRANSVERSE MAGNETIC FIELD SOURCE OR CROSSED ELECTRIC FIELD IN THE SPANWISE DIRECTION.
AD-609 534 DIV. 9
LOCAL BOUNDARY LAYER APPROXIMATIONS OF REGULAR FLOWS PAST A SEMI-INFINITE PLATE.
AD-609 599 DIV. 9

•FLIGHT CONTROL SYSTEMS
PNEUMATIC SERVOMECHANISMS
BASIC APPLIED RESEARCH IN FLUID POWER CONTROL.
AD-609 652 DIV. 12

VERTICAL TAKEOFF PLANES
ADVANCED FLIGHT CONTROL SYSTEM CONCEPTS FOR VTOL AIRCRAFT.
AD-609 553 DIV. 1

•FLIGHT INSTRUMENTS
DISPLAY SYSTEMS
JANAIR: JOINT ARMY-NAVY AIRCRAFT INSTRUMENTATION RESEARCH. ANALYSIS OF PICTORIAL DISPLAYS.
AD-609 762 DIV. 1

•FLIGHT TESTING
THEORY
PERFORMANCE FLIGHT TESTING THEORY.
AD-609 489 DIV. 1

•FLOATING BODIES
PHYSICAL PROPERTIES
PROPERTIES OF BUOYANT MATERIALS AND STRUCTURES.
AD-609 821 DIV. 14

•FLOW VISUALIZATION
COLLOIDS
USE OF DOUBLY REFRACTING SOLUTIONS IN THE INVESTIGATION OF FLUID FLOW PHENOMENA.
AD-609 632 DIV. 9

•FLUID FLOW
BOUNDARY LAYER
LOCAL BOUNDARY LAYER APPROXIMATIONS OF REGULAR FLOWS PAST A SEMI-INFINITE PLATE.
AD-609 599 DIV. 9

LAMINAR BOUNDARY LAYER
SOLUTIONS OF THE MAGNETOFLUID-DYNAMIC BOUNDARY-LAYER EQUATIONS FOR A FLAT PLATE WITH A MOVING TRANSVERSE MAGNETIC FIELD SOURCE OR CROSSED ELECTRIC FIELD IN THE SPANWISE DIRECTION.
AD-609 534 DIV. 9

SEPARATION
SEPARATION IN NON-UNIFORM SHEAR FLOW.
AD-609 778 DIV. 9

TEST METHODS
USE OF DOUBLY REFRACTING SOLUTIONS IN THE INVESTIGATION OF FLUID FLOW PHENOMENA.
AD-609 632 DIV. 9

•FLUID MECHANICS
AIRCRAFT ENGINES
TRANSLATION OF RUSSIAN RESEARCH: GASDYNAMICS OF ENGINES.
AD-609 492 DIV. 2

NUMERICAL ANALYSIS
FURTHER SIMILARITY SOLUTIONS OF WAKES AND JETS. PART I. TWO-DIMENSIONAL FLOWS. PART II. AXISYMMETRIC FLOWS.
AD-609 576 DIV. 9

SEPARATION
THE NEAR WAKE OF A WEDGE.
AD-609 577 DIV. 9

•FLUORIDES
CHEMICAL REACTIONS
REACTIONS OF INORGANIC COMPOUNDS IN NON-AQUEOUS SOLVENTS.
AD-609 712 DIV. 4

•FLUORINE COMPOUNDS
POLYMERS
SYNTHESIS AND PROPERTIES OF PERFLUORO-POLYTOLYLENES.
AD-609 448 DIV. 4

•FORCE (MECHANICS)
WATER WAVES
EXPERIMENTAL DETERMINATION OF WAVE-EXCITED FORCES AND MOMENTS ACTING ON A SHIP MODEL RUNNING IN OBLIQUE REGULAR WAVES.
AD-609 856 DIV. 9

•FOREIGN POLICY
INDONESIA
GANEFO II SPORTS AND POLITICS IN DJAKARTA.
AD-609 659 DIV. 32

•FRACTURE (MECHANICS)
ALLOYS
CRACK INITIATION IN METALLIC MATERIALS.
AD-609 739 DIV. 17

BRITTLENESS
TEMPERATURE-STRAIN RATE AND THE BRITTLE FRACTURE PROBLEM.
AD-609 666 DIV. 17

MATERIALS
STUDY OF DISLOCATION FAILURE PHENOMENA IN UNIFORM RADIAL AND TENSILE FIELDS.
AD-609 859 DIV. 28

STRUCTURAL SHELLS
THE STRESSES IN A CYLINDRICAL SHELL CONTAINING AN AXIAL CRACK.
AD-609 669 DIV. 28

•FRICTION
HEAT TRANSFER
TRANSLATION OF RUSSIAN RESEARCH: DEPENDENCE BETWEEN AERODYNAMIC HEAT TRANSFER AND FRICTION.
AD-609 788 DIV. 9

•FUEL CELLS
ELECTROCHEMISTRY
INVESTIGATION OF THE FUNDAMENTAL ELECTROCHEMICAL PARAMETERS INFLUENCING FUEL CELL PERFORMANCE.
AD-609 718 DIV. 7

•FUEL SYSTEMS
PERFORMANCE (ENGINEERING)
PROJECT BEARS (BACTERIOLOGICAL EFFECTS, AIRCRAFT REFUELING SYSTEMS) MICROBIAL CONTAMINATION OF JP-4 FUELS.
AD-609 527 DIV. 10

•FUEL TANKS
AVIATION SAFETY
STRUCTURAL DESIGN FOR FUEL CONTAINMENT UNDER SURVIVABLE CRASH CONDITIONS.
AD-609 615 DIV. 1

•FUNCTIONS
SWITCHING CIRCUITS
REALIZATION OF BINARY SWITCHING FUNCTIONS WITH MAJORITY GATES.
AD-609 804 DIV. 7
ALGEBRAIC-GEOMETRIC TECHNIQUE FOR THE REALIZATION OF SWITCHING FUNCTIONS WITH M-OUT-OF-N DECISION GATES.
AD-609 909 DIV. 7

•FUNGUS DETERIORATION
JET ENGINE FUELS
PROJECT BEARS (BACTERIOLOGICAL EFFECTS, AIRCRAFT REFUELING SYSTEMS) MICROBIAL CONTAMINATION OF JP-4 FUELS.
AD-609 527 DIV. 10

•FUZE FUNCTIONING ELEMENTS
DESIGN
DESIGN AND DEVELOPMENT OF MECHANICAL MODULAR PROGRAMMER.
AD-609 737 DIV. 21

•GAME THEORY
ALGEBRAIC TOPOLOGY
TOPICS IN ANALYSIS. THEORETICAL MATHEMATICS.
AD-609 614 DIV. 19

CALCULUS OF VARIATIONS
DIFFERENTIAL GAMES AND OPTIMAL PURSUIT-EVASION STRATEGIES.
AD-609 772 DIV. 19

ECONOMICS
VALUES OF LARGE GAMES- VII: A GENERAL EXCHANGE ECONOMY WITH MONEY.
AD-609 648 DIV. 32

PROGRAMMING(COMPUTERS)
A HEURISTIC APPROACH TO SOLUTION OF CHECKERBOARD PUZZLES.
AD-609 570 DIV. 30

•GAS DETECTORS
FEASIBILITY STUDIES
CHEMICAL-ELECTRICAL SENSING: DETECTION OF TRACES OF HCL AND HF BY USE OF RADIOKRYPTONATES.
AD-609 721 DIV. 4

•GAS DISCHARGES
MAGNETIC FIELDS
EFFECT OF MAGNETIC FIELDS ON MICROWAVE GAS-DISCHARGE DUPLEXER CHARACTERISTICS.
AD-609 658 DIV. 8

•GAS FLOW
MATHEMATICAL MODELS
LINEARIZED ANALYSIS OF UNSTEADY, REACTING FLOWS WITH BODY FORCES.
AD-609 974 DIV. 9

MIXTURES
RESEARCH ON HYPERSONIC RAREFIED PLASMA FLOWS.
AD-609 496 DIV. 9

PARTICLES
DYNAMICS OF GAS-PARTICLE MIXTURES WITH FINITE PARTICLE VOLUME.
AD-609 598 DIV. 9

•GASES
HIGH TEMPERATURE RESEARCH
THERMODYNAMIC PROPERTIES OF CARBON-NITROGEN MIXTURES AT HIGH TEMPERATURES.
AD-609 670 DIV. 25

SPECTRA (ULTRAVIOLET)
AUTOIONIZATION SPECTRA OF GASES OBSERVED IN THE VACUUM ULTRAVIOLET.
AD-609 849 DIV. 25

•GATES (CIRCUITS)
SWITCHING CIRCUITS
REALIZATION OF BINARY SWITCHING FUNCTIONS WITH MAJORITY GATES.
AD-609 804 DIV. 7
ALGEBRAIC-GEOMETRIC TECHNIQUE FOR THE REALIZATION OF SWITCHING FUNCTIONS WITH M-OUT-OF-N DECISION GATES.
AD-609 909 DIV. 7

•GENETICS
SELECTION
NOTE ON REPEATED SELECTION IN THE NORMAL CASE.
AD-609 469 DIV. 32

STATISTICAL ANALYSIS
ON THE PROBABILITY DISTRIBUTION OF X MODULO N.
AD-609 469 DIV. 32

•GEODESICS
LASERS
LASER ACTIVITIES AND BACKGROUND RADIATION STUDIES.
AD-609 759 DIV. 25

•GEOMETRIC FORMS
LINEAR PROGRAMMING
PATHS IN POLYHEDRA. II.
AD-609 498 DIV. 19
PATHS IN POLYHEDRA. I.
AD-609 571 DIV. 19

•GLASS TEXTILES
LAMINATED PLASTICS
GLASS/RESIN INTERFACE: PATENT SURVEY, PATENT LIST, AND GENERAL BIBLIOGRAPHY.
AD-609 526 DIV. 14

REINFORCING MATERIALS
RESIDUAL STRESSES IN THICK GLASS FILAMENT REINFORCED LAMINATES.
AD-609 610 DIV. 14
OPTIMUM FILAMENT DIAMETERS FOR STRUCTURAL COMPOSITE FOR DEEP SUBMERSIBLES.
AD-609 695 DIV. 31
ANALYSIS OF GLASS REINFORCED PLASTICS FOR HYDROSPACE APPLICATIONS.
AD-609 708 DIV. 14
FILAMENT-WINDING PLASTICS. PART 2. ROLE OF THE RESIN IN GLASS-FIBER-REINFORCED STRUCTURES UNDER TENSILE STRESS.
AD-609 770 DIV. 14

•GRAPHITE
RADIOGRAPHY
RADIOGRAPHIC TECHNIQUES OF GRAPHIC EVALUATION.
AD-609 877 DIV. 30

•GROUP DYNAMICS
BEHAVIOR
DIMENSIONS OF STIMULUS SITUATIONS WHICH ACCOUNT FOR BEHAVIOR VARIANCE.
AD-609 739 DIV. 28

CONFINED ENVIRONMENTS
STRUCTURAL CHANGE IN SMALL ISOLATED GROUPS.
AD-609 543 DIV. 28
COMPATIBILITY AMONG WORK ASSOCIATES IN ISOLATED GROUPS.
AD-609 544 DIV. 28

HOUSING
HISTORICAL INCIDENTS OF EXTREME OVERCROWDING FOR POSSIBLE ANALOGY TO CIVIL DEFENSE SHELTERS.
AD-609 752 DIV. 32

SOCIAL PSYCHOLOGY
STRUCTURAL FACTORS AND INDIVIDUAL NEEDS IN GROUP BEHAVIOR.
AD-609 446 DIV. 28

•GROUPS (MATHEMATICS)
MAPPING (TRANSFORMATIONS)
ALGEBRAIC THEORY OF MACHINES. I. THE MAIN DECOMPOSITION THEOREM. PRIME DECOMPOSITION THEOREM FOR FINITE SEMIGROUPS.
AD-609 981 DIV. 30

•GUIDED MISSILE TRACKING SYSTEMS
RADAR EQUIPMENT
AN/FPA-22(XN-1), AN/FPA-23(XN-1), L/UHF-BAND PENCIL BEAM RADARS.
AD-609 633 DIV. 6

•GUIDED MISSILE TRAJECTORIES
PROPORTIONAL NAVIGATION
DIFFERENTIAL GAMES AND OPTIMAL PURSUIT-EVASION STRATEGIES.
AD-609 772 DIV. 19

•GUIDED MISSILES (SURFACE-TO-SURFACE)
VULNERABILITY
PENETRATION AND CRATERING.
AD-609 692 DIV. 12

•GUIDED MISSILES
FINS
VIBRATION OF RECTANGULAR AND SKEW CANTILEVER PLATES REPRESENTING IDEALIZED MISSILE FINS.
AD-609 742 DIV. 12

•GUN COMPONENTS
MATERIALS
RESEARCH AND DEVELOPMENT OF MATERIALS FOR GUNS AT WATERTOWN ARSENAL LABORATORIES. IMPACT PROPERTIES OF STEEL MICROSTRUCTURES.
AD-609 672 DIV. 22

•HALIDES
SUBLIMATION
RATE OF SUBLIMATION OF AMMONIUM HALIDES.
AD-609 814 DIV. 4

•HALOCARBON PLASTICS
SYNTHESIS (CHEMISTRY)
SYNTHESIS AND PROPERTIES OF PERFLUORO-POLYTOLYLENES.
AD-609 448 DIV. 4

•HALOGENATED HYDROCARBONS
SYNTHESIS (CHEMISTRY)
SYNTHESIS AND PROPERTIES OF ALKYLAROMATIC CHLOROCARBONS.
AD-609 569 DIV. 4

•HANDBOOKS
COLUMBIA
U. S. ARMY AREA HANDBOOK FOR COLOMBIA.
AD-609 556 DIV. 32

CYPRUS
U. S. ARMY AREA HANDBOOK FOR CYPRUS.
AD-609 948 DIV. 32

ETHIOPIA
U. S. ARMY AREA HANDBOOK FOR ETHIOPIA.
AD-609 949 DIV. 32

JAPAN
U. S. ARMY AREA HANDBOOK FOR JAPAN.
AD-609 951 DIV. 32

SUDAN
U. S. ARMY AREA HANDBOOK FOR THE REPUBLIC OF THE SUDAN.
AD-609 950 DIV. 32

(CRYOGENICS)
CRYOGENIC MATERIALS DATA HANDBOOK.
AD-609 962 DIV. 25

•HEAT TRANSFER
ATMOSPHERIC MOTION
HEAT TRANSPORT BY LARGE-SCALE ATMOSPHERIC WAVES DURING OCTOBER 1959-MARCH 1960.
AD-609 803 DIV. 2

HYPERSONIC FLOW
PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR MACH 21 FLOWS OVER A BLUNT PYRAMIDAL CONFIGURATION WITH AERODYNAMIC CONTROLS. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS.
AD-609 559 DIV. 9

LAMINAR FLOW
REVIEW OF THEORETICAL INVESTIGATIONS ON THE EFFECT OF HEAT TRANSFER ON LAMINAR SEPARATION.
AD-609 575 DIV. 9

MOLYBDENUM
COMPUTER ANALYSIS OF THE HEAT FLOW IN THE VACUUM ARC MELTING OF MOLYBDENUM.
AD-609 651 DIV. 17

PLANTS (BOTANY)
VERTICAL FLUXES WITHIN THE VEGETATIVE CANOPY OF A CORN FIELD.
AD-609 740 DIV. 2

SUPERSONIC FLOW
TRANSLATION OF RUSSIAN RESEARCH: DEPENDENCE BETWEEN AERODYNAMIC HEAT TRANSFER AND FRICTION.
AD-609 788 DIV. 9

•HEATRESISTANT PLASTICS
SYNTHESIS (CHEMISTRY)
SYNTHESIS AND PROPERTIES OF PERFLUORO-POLYTOLYLENES.
AD-609 448 DIV. 4

•HELIUM
ATOMIC ENERGY LEVELS
DEEXCITATION OF HELIUM ATOMS IN THE METASTABLE TRIPLET STATE IN PURE HE: APPLICATION OF THE HE MAGNETOMETER.
AD-609 832 DIV. 6

•HELMETS
COMMUNICATION EQUIPMENT
PERSONNEL COMMUNICATIONS IN SPACE-A STUDY OF SPEECH TRANSMISSION AND HELMET COMFORT.
AD-609 604 DIV. 29

•HONEYCOMB CORES
ALUMINUM ALLOYS
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 867 DIV. 26
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 868 DIV. 26
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 871 DIV. 26

SANDWICH PANELS
METHOD FOR PREDICTING THERMAL RESPONSE IN SANDWICH PANELS.
AD-609 906 DIV. 19

•HOUSING
HISTORY
HISTORICAL INCIDENTS OF EXTREME OVERCROWDING FOR POSSIBLE ANALOGY TO CIVIL DEFENSE SHELTERS.
AD-609 792 DIV. 32

•HYDROCARBONS
NITRATION
STUDIES OF LOW-TEMPERATURE OXIDATION REACTIONS.
AD-609 800 DIV. 4

•HYDRODYNAMICS
GAS FLOW
RESEARCH ON HYPERSONIC RAREFIED PLASMA FLOWS.
AD-609 496 DIV. 9

•HYDROFOILS
FLUTTER
FORCED VIBRATION OF BEAMS AND FLUTTER OF BEAM-FOIL SYSTEMS.
AD-609 499 DIV. 9

LIFT
THEORY OF THE LOW-ASPECT-RATIO JET-FLAP HYDROFOIL.
AD-609 729 DIV. 9

•HYDROGRAPHIC SURVEYING
MEXICO GULF
NORTHEAST GULF OF MEXICO HYDROGRAPHIC SURVEY DATA COLLECTED IN 1963.
AD-609 719 DIV. 2

•HYPERSONIC FLIGHT
SIMULATION
CALIBRATION OF A PLASMA JET FACILITY FOR SIMULATION OF BALLISTIC MISSILE RE-ENTRY.
AD-609 593 DIV. 12

•HYPERSONIC FLOW
AERODYNAMIC CONFIGURATIONS
PRESSURE MEASUREMENTS FOR MACH 8 FLOWS OVER EXPANSION CORNERS AND RAMPS ON AN INTERNALLY COOLED MODEL. PART II. FLOWS OVER A FLAT PLATE WITH AND WITHOUT A PARTIAL SPAN RAMP. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS.
AD-609 458 DIV. 9

MATHEMATICAL MODELS
RESEARCH ON HYPERSONIC RAREFIED PLASMA FLOWS.
AD-609 496 DIV. 9

RADAR ECHO AREAS
RADAR CROSS SECTION OF AN IONIZED WAKE OF A HYPERSONIC BODY.
AD-609 512 DIV. 6

SEPARATION
PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR MACH 21 FLOWS OVER A BLUNT PYRAMIDAL CONFIGURATION WITH AERODYNAMIC CONTROLS. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS.
AD-609 559 DIV. 9

•HYPERVELOCITY PROJECTILES
CRATERING
CRATERING PRODUCED IN METALS BY HIGH-VELOCITY IMPACT.
AD-609 641 DIV. 22

•INDONESIA
RECREATION
GANEFO I: SPORTS AND POLITICS IN DJAKARTA.
AD-609 659 DIV. 32

•INDUCTION HEATING
PLASMA MEDIUM
INDUCTIVE PLASMA HEATING USING A MULTI-TURN COIL.
AD-609 834 DIV. 25

•INEQUALITIES
NUMERICAL METHODS AND PROCEDURES
AN EXPONENTIALLY CONVERGENT AND FINITE ALGORITHM FOR LINEAR INEQUALITIES.
AD-609 777 DIV. 19

•INFORMATION RETRIEVAL
LIBRARIES
ROLE OF THE TECHNICAL LIBRARY IN SUPPORT OF AN INFORMATION CENTER.
AD-609 829 DIV. 32

READING MACHINES
STUDIES IN BEHAVIORAL ASPECTS OF GRAMMAR AND SEMANTICS.
AD-609 807 DIV. 28

SCIENTIFIC PERSONNEL
INFORMATION AND SCIENTIFIC CREATIVITY.
AD-609 486 DIV. 28

SEISMOLOGY
AUTOMATED BULLETIN AND SEISMIC DATA RETRIEVAL SYSTEM.
AD-609 928 DIV. 2

•INFRARED FILTERS
COATINGS
INFRARED COATING STUDIES: RESTSTRAHLEN ENHANCEMENT OF FLUORIDE CRYSTALS.
AD-609 779 DIV. 19

•INFRARED OPTICAL MATERIALS
FIBER OPTICS
LONG WAVELENGTH INFRARED FIBER OPTICS.
AD-609 842 DIV. 19

•INFRARED SPECTROSCOPY
PHOSPHATE GLASS
INFRARED SPECTRA OF METAPHOSPHATE GLASSES.
AD-609 606 DIV. 19

•INSTRUMENT PANELS
DISPLAY SYSTEMS
JANAIR: JOINT ARMY-NAVY AIRCRAFT INSTRUMENTATION RESEARCH. ANALYSIS OF PICTORIAL DISPLAYS.
AD-609 762 DIV. 1

•INTEGRAL EQUATIONS
NUMERICAL METHODS AND PROCEDURES
ALGORITHM FOR SOLVING VOLTERRA INTEGRAL EQUATIONS MET IN PROCESS IDENTIFICATION.
AD-609 869 DIV. 15

•INTEGRALS
PROBABILITY
TABLES FOR THE STUDENTIZED LARGEST CHI-SQUARE DISTRIBUTION AND THEIR APPLICATIONS.
AD-609 588 DIV. 15

SPECIFIC HEAT
TABLE ON THE DEBYE FUNCTIONS.
AD-609 702 DIV. 25

•INTEGRATED CIRCUITS
SEMICONDUCTING FILMS
COMPATIBLE ACTIVE THIN-FILM INTEGRATED STRUCTURES.
AD-609 961 DIV. 8

SEMICONDUCTOR DEVICES
OPTOELECTRONIC FUNCTIONAL ELECTRONIC BLOCKS.
AD-609 909 DIV. 8

•INTEGRATION
DIFFERENTIAL EQUATIONS
TRANSLATION OF RUMANIAN RESEARCH: RUNGE-KUTTA TYPE PROCEDURES OF ORDER OF ACCURACY N 4 (N > 2) WITH THREE NODES FOR NUMERICAL INTEGRATION OF FIRST-ORDER DIFFERENTIAL EQUATIONS.
AD-609 692 DIV. 15
NUMERICAL INTEGRATION OF A DIFFERENTIAL-DIFFERENCE EQUATION WITH A DECREASING TIME-LAG.
AD-609 839 DIV. 15

•INTELLIGENCE TESTS
PATTERN RECOGNITION
PROGRAM FOR THE SOLUTION OF A CLASS OF GEOMETRIC-ANALOGY INTELLIGENCE-TEST QUESTIONS: MACHINE ANALYSIS AND SOLUTION TO PROBLEMS.
AD-609 849 DIV. 30

SCIENTIFIC PERSONNEL
IDENTIFYING RESEARCH CHARACTERISTICS IN HIGH SCHOOL STUDENTS: SEARCH METHODS FOR SCIENTIFIC TALENT FOR MILITARY PERSONNEL RECRUITMENT.
AD-609 489 DIV. 23

•INTERMETALLIC COMPOUNDS
AGING (MATERIALS)
MECHANICAL BEHAVIOR OF THE INTERMETALLIC COMPOUNDS VCO3, VNI3, AND VNI2.
AD-609 706 DIV. 17

•IONIZATION
EQUATIONS OF STATE
TRANSLATION OF JAPANESE RESEARCH: ON THE STEADY STATE OF IONIZATION IN WEAKLY IONIZED PLASMA IN THE NON EQUILIBRIUM STATE.
AD-609 439 DIV. 25

ES
CHANGES IN THE CHEMICAL COMPOSITION OF THE ATMOSPHERE FOLLOWING INTENSE IONIZATION IMPULSES.
AD-609 792 DIV. 2

•IONOSPHERE
CHEMICAL REACTIONS
IONOSPHERIC PROCESSES AND NITRIC OXIDE.
AD-609 849 DIV. 2

•IONOSPHERIC DISTURBANCES
IONIZATION
CHANGES IN THE CHEMICAL COMPOSITION OF THE ATMOSPHERE FOLLOWING INTENSE IONIZATION IMPULSES.
AD-609 792 DIV. 2

•IONOSPHERIC PROPAGATION
MULTIPATH TRANSMISSION
PROCEEDINGS OF THE TROPOSPHERIC REFRACTION EFFECTS MEETING (NO. 3). VOLUME I. RESULTS AND STATUS OF TROPOSPHERIC-EFFECTS MEASUREMENT PROGRAM.
AD-609 731 DIV. 8

•IONS
RARE EARTHS
RARE EARTH IONS IN CRYSTALLINE FIELDS.
AD-609 541 DIV. 20

STATISTICAL MECHANICS
STUDIES TO DETERMINE THE MECHANISM OF PRODUCTION AND REMOVAL OF ELECTRONS IN FLAMES.
AD-609 515 DIV. 10

•IRON
DIFFUSION
DIFFUSIVITY OF IRON IN LIQUID SLAGS.
AD-609 459 DIV. 17

SINGLE CRYSTALS
FIELD ION MICROSCOPY OF IRON WHISKERS.
AD-609 859 DIV. 17

•ITERATIVE METHODS
LINEAR PROGRAMMING
CLASS OF LINEAR PROGRAMMING PROBLEMS REQUIRING A LARGE NUMBER OF ITERATIONS.
AD-609 586 DIV. 15
AN EXPONENTIALLY CONVERGENT AND FINITE ALGORITHM FOR LINEAR INEQUALITIES.
AD-609 777 DIV. 15

•JAPAN
HANDBOOKS
U. S. ARMY AREA HANDBOOK FOR JAPAN.
AD-609 991 DIV. 32

•JET ENGINE FUELS
BIOLOGICAL CONTAMINATION
PROJECT BEARS (BACTERIOLOGICAL EFFECTS, AIRCRAFT REFUELING SYSTEMS) MICROBIAL CONTAMINATION OF JP-4 FUELS.
AD-609 527 DIV. 10

•JET FLAPS
HYDROFOILS
THEORY OF THE LOW-ASPECT-RATIO JET-FLAP HYDROFOIL.
AD-609 729 DIV. 9

•JOURNAL BEARINGS
TURBOPUMPS
HYDROSTATIC BEARING FEASIBILITY PROGRAM.
AD-609 628 DIV. 27

•KRYPTON
GAS DETECTORS
CHEMICAL-ELECTRICAL SENSING: DETECTION OF TRACES OF HCL AND HF BY USE OF RADIOKRYPTONATES.
AD-609 721 DIV. 9

•LABORATORIES
MARINE PROPULSION
MORRIS DAM MARINE PROPULSION LABORATORY.
AD-609 819 DIV. 27

•LAMINAR BOUNDARY LAYER
SEPARATION
LAMINAR BOUNDARY-LAYER SEPARATION ON FLARED BODIES AT SUPERSONIC AND HYPERSONIC SPEEDS.
AD-609 841 DIV. 9

•LAMINAR FLOW
SEPERATION
REVIEW OF THEORETICAL INVESTIGATIONS ON THE EFFECT OF HEAT TRANSFER ON LAMINAR SEPARATION.
AD-609 575 DIV. 9

•LAMINATED PLASTICS
FILAMENT WOUND CONSTRUCTION
RESIDUAL STRESSES IN THICK GLASS FILAMENT REINFORCED LAMINATES.
AD-609 610 DIV. 14

GLASS TEXTILES
GLASS/RESIN INTERFACE: PATENT SURVEY, PATENT LIST, AND GENERAL BIBLIOGRAPHY.
AD-609 526 DIV. 14

•LANDING CRAFT
SYSTEM TEST VESSELS
LAND CRAFT UTILITY 1466 MOBILE TEST FACILITY.
AD-609 878 DIV. 22

•LANGUAGE
VERBAL BEHAVIOR
STUDIES IN BEHAVIORAL ASPECTS OF GRAMMAR AND SEMANTICS.
AD-609 807 DIV. 28

•LASERS
GEODESICS
LASER ACTIVITIES AND BACKGROUND RADIATION STUDIES.
AD-609 759 DIV. 25

OPTICAL EQUIPMENT COMPONENTS
INVESTIGATION OF PASSIVE LASER Q-SWITCHING.
AD-609 643 DIV. 25

RESONATORS
ANALYSIS OF PERTURBED CONFOCAL RESONATORS.
AD-609 769 DIV. 25

SEMICONDUCTORS
SEMICONDUCTOR LASER AMPLIFIER TECHNIQUES (SEMLAM).
AD-609 709 DIV. 25

SOLID STATE PHYSICS
SOLID STATE RESEARCH.
AD-609 828 DIV. 29

SYMPOSIA
APPLICATIONS OF LASERS.
AD-609 846 DIV. 28

•LEARNING
ANALYSIS
MODEL AND CYBERNETIC SYSTEM FOR RESEARCH ON THE TEACHING-LEARNING PROCESS.
AD-609 940 DIV. 23

TIME LAG THEORY
DETECTION OF RATE CHANGES IN PERIODIC PHENOMENA.
AD-609 698 DIV. 28

•LIBRARIES
INFORMATION RETRIEVAL
ROLE OF THE TECHNICAL LIBRARY IN SUPPORT OF AN INFORMATION CENTER.
AD-609 825 DIV. 32

•LIFE SUPPORT
REVIEWS
ABSTRACTS OF SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS: BIOSCIENCES.
AD-609 827 DIV. 16

•LIGHT
FREQUENCY MODULATION
STUDY OF A SCINTILLATION MECHANISM.
AD-609 848 DIV. 29

•LIMITERS
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE: SPHERES OF YTTRIUM, IRON AND GARNET FOR FABRICATING POWER LIMITERS.
AD-609 661 DIV. 8

•LINEAR PROGRAMMING
DECISION MAKING
MINIMUM NUMBER OF LINEAR DECISION FUNCTIONS TO IMPLEMENT A DECISION PROCESS.
AD-609 476 DIV. 15

GEOMETRIC FORMS
PATHS IN POLYHEDRA. II.
AD-609 498 DIV. 15
PATHS IN POLYHEDRA. I.
AD-609 571 DIV. 15

ITERATIVE METHODS
CLASS OF LINEAR PROGRAMMING PROBLEMS REQUIRING A LARGE NUMBER OF ITERATIONS.
AD-609 586 DIV. 15

LEAST SQUARES METHOD
AN EXPONENTIALLY CONVERGENT AND FINITE ALGORITHM FOR LINEAR INEQUALITIES.
AD-609 777 DIV. 15

PRODUCTION CONTROL
MARKOVIAN DECISION MODELS FOR REJECT ALLOWANCE PROBLEMS.
AD-609 677 DIV. 26

•LIQUID LEVEL GAGES
RADIOACTIVE ISOTOPES
APPLICATION OF RADIOISOTOPE LIQUID LEVEL GAGES AT THE AIR FORCE ROCKET PROPULSION LABORATORY.
AD-609 836 DIV. 27

•LIQUID METALS
NUCLEAR SCATTERING
DETERMINATION OF X-RAY SCATTERING FACTORS WITH LIQUID SPECIMENS.
AD-609 603 DIV. 20

•LITHOSPHERE
ELECTRICAL CONDUCTANCE
INVESTIGATIONS OF ELECTRICAL CHARACTERISTICS OF THE SUB SURFACE ROCK MEDIUM IN ESSEX COUNTRY, NEW YORK.
AD-609 683 DIV. 2

•LOADING (MECHANICS)
CYLINDRICAL BODIES
RANDOM LOADING AND RADIATION FROM STIFFENED AND SANDWICH TYPE CYLINDRICAL SHELL STRUCTURES. PART II, UNSYMMETRICAL LOADING WITH KNOWN SPACE DISTRIBUTION.
AD-609 634 DIV. 29

STRESS ANALYSIS OF A CYLINDER PRESSURE-LOADED OVER EQUAL AND OPPOSITE ARCS.
AD-609 640 DIV. 25

HARDENING
EXTENDED DISPLACEMENT BOUND THEOREMS FOR WORK HARDENING CONTINUA SUBJECTED TO IMPULSIVE LOADING.
AD-609 760 DIV. 25

•LOW-ORBIT TRAJECTORIES
PERTURBATION THEORY
INFLUENCES OF SMALL DIFFERENCES IN BALLISTIC COEFFICIENT ON SATELLITE STATION KEEPING.
AD-609 880 DIV. 12

•LUBRICANTS
FILMS
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
AD-609 937 DIV. 14

SPECTROSCOPY
SPECTROMETRIC ANALYSIS OF AIRCRAFT OILS AS A MEANS OF PREDICTING ENGINE FAILURE.
AD-609 743 DIV. 27
EFFECTIVENESS OF THE SPECTROMETRIC OIL ANALYSIS METHOD FOR MONITORING AIRCRAFT MECHANISMS.
AD-609 746 DIV. 27

•LUBRICATION
WEAR RESISTANCE
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
AD-609 937 DIV. 14

•LUMINESCENCE
MATERIALS
CHEMILUMINESCENT SYSTEMS: ALKALINE PEROXIDE OXIDATIONS AND SCREENING FOR CHEMILUMINESCENCE AUTOXIDATION REACTIONS.
AD-609 609 DIV. 4

•MACHINE TRANSLATION
WEST GERMANY
TRANSLATION OF PRESS ITEM REGARDING USE OF DATA PROCESSING BY TERMINOLOGY GROUP OF THE WESTERN GERMANY ARMED FORCES IN MANNHEIM.
AD-609 620 DIV. 30

•MAGNESIUM ALLOYS
CORROSION
CORROSION OF METALS IN TROPICAL ENVIRONMENTS. PART 6. ALUMINUM AND MAGNESIUM.
AD-609 618 DIV. 17

•MAGNETIC FIELDS
GAS DISCHARGES
EFFECT OF MAGNETIC FIELDS ON MICROWAVE GAS-DISCHARGE DUPLEXER CHARACTERISTICS.
AD-609 658 DIV. 8

•MAGNETIC RESONANCE
SOLID STATE PHYSICS
SOLID STATE RESEARCH.
AD-609 828 DIV. 25

•MAGNETOHYDRODYNAMICS
ELECTRIC PROPULSION
INDUCTIVE PLASMA ACCELERATION RESEARCH.
AD-609 728 DIV. 27

ELECTRON BEAMS
THE DIOCOTRON INSTABILITY IN A CYLINDRICAL GEOMETRY.
AD-609 638 DIV. 8

FIELD THEORY
SOLUTIONS OF THE MAGNETOFLUID-DYNAMIC BOUNDARY-LAYER EQUATIONS FOR A FLAT PLATE WITH A MOVING TRANSVERSE MAGNETIC FIELD SOURCE OR CROSSED ELECTRIC FIELD IN THE SPANWISE DIRECTION.
AD-609 534 DIV. 9

POWER SERIES
EXTENSION OF THE M2-AND THE THIN-WING EXPANSION METHODS TO MAGNETOHYDRODYNAMICS.
AD-609 968 DIV. 9

ROTATION
FUNDAMENTAL THEORETICAL AND EXPERIMENTAL STUDIES OF ROTARY MAGNETOHYDRODYNAMICS.
AD-609 812 DIV. 25

•MAGNETOMETERS
HELIUM
DEEXCITATION OF HELIUM ATOMS IN THE METASTABLE TRIPLET STATE IN PURE HE: APPLICATION OF THE HE MAGNETOMETER.
AD-609 832 DIV. 6

•MAINTENANCE
MANAGEMENT ENGINEERING
ASSESSING THE IMPACT OF WEAPON SYSTEM MODIFICATIONS BY FIELD STUDY: A FEASIBILITY DEMONSTRATION.
AD-609 791 DIV. 18

•MANAGEMENT ENGINEERING
ARMED FORCES
VALUE ANALYSIS (VALUE NGINEERING). A TECHNIQUE FOR OBTAINING MORE VALUE FOR THE DEFENSE DOLLAR.
AD-609 520 DIV. 18

COSTS
SUPPLEMENT TO 'MANAGEMENT OF VALUE ENGINEERING PROGRAMS IN DEFENSE CONTRACTS': INSTRUCTOR'S NOTES FOR CASE PROBLEMS IN THE CONTRACTUAL ASPECTS OF VALUE ENGINEERING.
AD-609 883 DIV. 18
SUPPLEMENT TO 'MANAGEMENT OF VALUE ENGINEERING PROGRAMS IN DEFENSE CONTRACTS': TRAINING AIDS: DESCRIPTION AND FORMAT.
AD-609 884 DIV. 18

WEAPON SYSTEMS
PRODUCT IMPROVEMENT CANDIDATE SELECTION AND MANAGEMENT INFORMATION; WEAPON SYSTEM ANALYSIS.
AD-609 793 DIV. 18

•MANAGEMENT PLANNING
ECONOMICS
NATIONAL PRIORITIES AND DEVELOPMENT STRATEGIES IN SOUTHEAST ASIA.
AD-609 660 DIV. 32

•MANNED SPACECRAFT
SHIELDING
VULNERABILITY OF MANNED ORBITAL COMMAND POSTS TO NATURAL SPACE RADIATIONS.
AD-609 901 DIV. 12

•MANUFACTURING METHODS
SHELTERS
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES. VOLUME II.
AD-609 806 DIV. 3

TRANSMIT-RECEIVE TUBES
RUGGEDIZED MICROWAVE DUPLEXING TUBES: PRODUCTION ENGINEERING MEASURES PROGRAM.
AD-609 761 DIV. 8

•MARINE BIOLOGY
MEXICO GULF
MARINE ICHTHYOFAUNA OF ST. ANDREW BAY, FLORIDA, AND NEARSHORE HABITATS OF THE NORTHEASTERN GULF OF MEXICO.
AD-609 719 DIV. 2

•MARINE PROPULSION
LABORATORIES
MORRIS DAM MARINE PROPULSION LABORATORY.
AD-609 819 DIV. 27

•MARKERS
CONTAINERS
DEVELOPMENT AND EVALUATION OF POLYSTYRENE FOAM CONTAINER FOR MK 66 TYPE SUBMARINE SIGNALS.
AD-609 647 DIV. 26

•MATCHED FILTERS
PULSE COMPRESSION
EFFECTS OF MISMATCH AND DISTORTION ON THE OUTPUT SIGNAL OF A LINEAR FM PULSE-COMPRESSION FILTER.
AD-609 478 DIV. 8

•MATERIALS
BUOYANCY
PROPERTIES OF BUOYANT MATERIALS AND STRUCTURES.
AD-609 821 DIV. 14

FRACTURE (MECHANICS)
STUDY OF DISLOCATION FAILURE PHENOMENA IN UNIFORM RADIAL AND TENSILE FIELDS.
AD-609 859 DIV. 25

•MATHEMATICAL MODELS
PERFORMANCE (HUMAN)
METHOD FOR DERIVING JOB STANDARDS FROM SYSTEM EFFECTIVENESS CRITERIA. VOLUME I. METHOD DEVELOPMENT.
AD-609 725 DIV. 23

SONAR SIGNALS
OPTIMUM SIGNAL DESIGN AND PROCESSING FOR REVERBERATION, LIMITED ENVIRONMENTS.
AD-609 589 DIV. 6

STATISTICAL PROCESSES
MARKOVIAN DECISION MODELS FOR REJECT ALLOWANCE PROBLEMS.
AD-609 677 DIV. 26

URBAN PLANNING
MULTIPLE EQUATION MODEL OF HOUSEHOLD LOCATIONAL AND TRIPMAKING BEHAVIOR.
AD-609 758 DIV. 33

•MEASURING DEVICES (ELECTRICAL AND ELECTRONIC)
PRODUCTION
PRODUCTION ENGINEERING MEASURE FOR METERS, TAUT-BAND SUSPENSION, A-C MOVING IRON VANE PER SIGNAL CORPS REQUIREMENTS SCS-160.
AD-609 510 DIV. 7

•MECHANICAL FASTENERS
REFRACTORY METAL ALLOYS
REFRACTORY METAL ALLOY FASTENERS.
AD-609 693 DIV. 26

•MECHANICAL WAVES
SPHERES
TRANSIENT REPSONSE OF A RIGID SPHERICAL INCLUSION IN AN ELASTIC MEDIUM.
AD-609 890 DIV. 25

•MEMBRANES (BIOLOGY)
HISTOLOGY
COMPARATIVE HISTOLOGICAL STUDY OF THE REINFORCED AREA OF THE SACCULAR MEMBRANE IN MAMMALS.
AD-609 443 DIV. 16

•METABOLISM
FISSION PRODUCTS
CONSEQUENCES OF INGESTION BY MAN OF REAL AND SIMULATED FALLOUT.
AD-609 624 DIV. 16

•METAL FILMS
MAGNETIC PROPERTIES
MAGNETIC PROPERTIES OF ELECTRODEPOSITED NICKEL-IRON-COBALT FILMS.
AD-609 829 DIV. 17

VAPOR PLATING
STRUCTURE AND STRENGTH OF EPITAXIAL FILMS.
AD-609 730 DIV. 25

•METAL PLATES
VIBRATION
VIBRATION OF RECTANGULAR AND SKEW CANTILEVER PLATES REPRESENTING IDEALIZED MISSILE FINS.
AD-609 742 DIV. 12

•METALLOGRAPHY
BRITTLENESS
TEMPERATURE-STRAIN RATE AND THE BRITTLE FRACTURE PROBLEM.
AD-609 666 DIV. 17

SEMICONDUCTORS
METALLURGICAL ASPECTS OF GAAS-GE HETEROJUNCTIONS.
AD-609 611 DIV. 17

•METALORGANIC COMPOUNDS
CHEMICAL REACTIONS
TRANSLATION OF RUSSIAN RESEARCH: REACTIONS OF ROXYQUINOLINE TRIBUTOXY TITANIUM WITH ALPHA, OMEGADIHYDROXY-POLYDIMETGHYL-SILOXANE.
AD-609 787 DIV. 4

POLYMERS
TRANSLATION OF RUSSIAN RESEARCH: ELECTRIC AND MAGNETIC PROPERTIES OF THERMALLY TREATED FERROCENE BASE POLYMERS.
AD-609 782 DIV. 4

•METALS
CRATERING
CRATERING PRODUCED IN METALS BY HIGH-VELOCITY IMPACT.
AD-609 691 DIV. 22

SOLUTIONS
EFFECT OF ADDED ELECTROLYTES OF THE E. S. R. AND OPTICAL ABSORPTION OF MET/L-AMMONIA SOLUTIONS.
AD-609 557 DIV. 4

•METEORITES
THEORY
NOTES ON THE BEGINNINGS OF MODERN METEORITICS.
AD-609 879 DIV. 2

•METEOROLOGICAL RADAR
DATA PROCESSING SYSTEMS
STORM RADAR DATA PROCESSOR EVALUATION.
AD-609 820 DIV. 2

•METEOROLOGICAL SATELLITES
SOLAR RADIATION
ANALYSIS OF DAYTIME RADIATION DATA FROM TIROS IV.
AD-609 767 DIV. 2

WEATHER FORECASTING
PRACTICAL INTERPRETATION OF METEOROLOGICAL SATELLITE DATA.
AD-609 493 DIV. 2

•METEORS
GUIDED MISSILES (SURFACE-TO-SURFACE)
PENETRATION AND CRATERING.
AD-609 642 DIV. 12

•METERS
CARBON DIOXIDE
MODIFICATION OF THE RINGROSE CARBON DIOXIDE METER.
AD-609 881 DIV. 31

•MICROMETEOROLGY
HEAT TRANSFER
VERTICAL FLUXES WITHIN THE VEGETATIVE CANOPY OF A CORN FIELD.
AD-609 740 DIV. 2

•MICROWAVE COMMUNICATION SYSTEMS
COMMUNICATION SATELLITES (PASSIVE)
MODIFICATIONS MADE TO THE USAF TRANSPORTABLE PASSIVE SATELLITE COMMUNICATIONS TERMINAL.
AD-609 809 DIV. 8

•MICROWAVE EQUIPMENT
ELECTRONIC SWITCHES
FAST HIGH POWER MICROWAVE SWITCHES. A SURVEY.
AD-609 695 DIV. 8

•MICROWAVE OSCILLATORS
CESIUM ELECTRON TUBES
ATOMIC OSCILLATOR DEVICE FOR NAVIGATION-GUIDANCE.
AD-609 776 DIV. 8

SEMICONDUCTOR DEVICES
RESEARCH ON MILLIMETER-WAVE GENERATION TECHNIQUES.
AD-609 629 DIV. 8

•MILITARY PERSONNEL
SELECTION
IDENTIFYING RESEARCH CHARACTERISTICS IN HIGH SCHOOL STUDENTS: SEARCH METHODS FOR SCIENTIFIC TALENT FOR MILITARY PERSONNEL RECRUITMENT.
AD-609 485 DIV. 23

SOCIOMETRICS
PERSONAL HISTORY CORRELATES OF MILITARY PERFORMANCE AT A LARGE ANTARCTIC STATION.
AD-609 542 DIV. 28

•MILITARY PSYCHOLOGY
POLAR REGIONS
PERFORMANCE EVALUATIONS OF ANTARCTIC VOLUNTEERS.
AD-609 546 DIV. 28

•MILITARY PUBLICATIONS
HANDBOOKS
U. S. ARMY AREA HANDBOOK FOR BRAZIL.
AD-609 483 DIV. 18

•MILITARY REQUIREMENTS
RESEARCH PROGRAM ADMINISTRATION
SELECTIVE AND ANNOTATED BIBLIOGRAPHY ON RESEARCH, DEVELOPMENT, TESTING AND EVALUATION OF MILITARY ITEMS.
AD-609 539 DIV. 13

•MILITARY SATELLITES
UNITED STATES
TRANSLATION OF SOVIET NEWSPAPER ARTICLE: WHY THE USA IS STRAINING TO GET INTO OUTER SPACE.
AD-609 585 DIV. 18

•MILLIMETER WAVES
OSCILLATORS
RESEARCH ON MILLIMETER-WAVE GENERATION TECHNIQUES.
AD-609 629 DIV. 8

RADIO ASTRONOMY
ELECTRONICS RESEARCH PROGRAM. RESEARCH AND EXPERIMENTATION ON SPACE APPLICATIONS OF MILLIMETER WAVES.
AD-609 594 DIV. 8

•MIRRORS
RESONATORS
ANALYSIS OF PERTURBED CONFOCAL RESONATORS.
AD-609 769 DIV. 29

•MIXTURES
HIGH TEMPERATURE RESEARCH
THERMODYNAMIC PROPERTIES OF CARBON-NITROGEN MIXTURES AT HIGH TEMPERATURES.
AD-609 670 DIV. 25

•MODELS (SIMULATIONS)
COMMAND AND CONTROL SYSTEMS
THE ROLE OF SIMULATION AND DATA REDUCTION PROGRAMS IN THE DEVELOPMENT OF REAL-TIME SYSTEMS.
AD-609 500 DIV. 30

•MODULES (ELECTRONICS)
PROTECTIVE MASKS
DYNAMIC MEASUREMENTS OF COMPARTMENT PRESSURE AND RESPIRATORY FLOW CONDITIONS WITHIN A PROTECTIVE MASK.
AD-609 582 DIV. 3

•MOISTURE PROOFING
WOOD
PRESERVATIVE TREATMENT OF WOOD FOR COMBAT VEHICLES.
AD-609 663 DIV. 19

•MOLYBDENUM ALLOYS
SHEETS
REFRACTORY ALLOY SHEET MATERIALS.
AD-609 819 DIV. 17

•MOLYBDENUM
REFINING (METALLURGY)
COMPUTER ANALYSIS OF THE HEAT FLOW IN THE VACUUM ARC MELTING OF MOLYBDENUM.
AD-609 691 DIV. 17

•MONITORS
CARBON DIOXIDE
MODIFICATION OF THE RINGROSE CARBON DIOXIDE METER.
AD-609 881 DIV. 31

PHYSIOLOGY
TECHNIQUES OF PHYSIOLOGICAL MONITORING: SYSTEMS.
AD-609 481 DIV. 16

SEISMOLOGY
LARGE APERTURE SEISMIC ARRAY.
AD-609 851 DIV. 6

•MOON
EXTRATERRESTRIAL TOPAGRAPHY
TRANSLATION OF RUSSIAN RESEARCH: PETROGRAPHIC INVESTIGATION OF THE LUNAR SURFACE BY JOINT USE OF PHOTOMETRIC AND COLORIMETRIC OBSERVATIONS.
AD-609 693 DIV. 2

•MOTION
SOLIDS
A LAGRANGIAN FINITE DIFFERENCE METHOD FOR TWO-DIMENSIONAL MOTION INCLUDING MATERIAL STRENGTH.
AD-609 523 DIV. 25

•MOTIVATION
PERFORMANCE (HUMAN)
EFFECTS OF GOAL DIFFICULTY ON PERFORMANCE: A FIELD EXPERIMENT.
AD-609 508 DIV. 28

•NAVAL PERSONNEL
PERFORMANCE (HUMAN)
METHOD FOR DERIVING JOB STANDARDS FROM SYSTEM EFFECTIVENESS CRITERIA. VOLUME I. METHOD DEVELOPMENT.
AD-609 729 DIV. 23

•NAVAL RESEARCH
REPORTS
REPORT OF NRL PROGRESS.
AD-609 525 DIV. 30

RESEARCH PROGRAM ADMINISTRATION
ONR POLICY ON RESEARCH.
AD-609 696 DIV. 30

•NAVAL VESSELS (SUPPORT)
VIBRATION
THE STEADY-STATE RESPONSE OF A SHIP HULL TO A SIMPLE HARMONIC DRIVING FORCE COMPUTED BY A DIGITAL PROCESS.
AD-609 631 DIV. 31

•NAVIGATION
SOLID STATE PHYSICS
CIRCUITRY FOR INTEGRATING COMPONENTS INTO SOLID-STATE TACAN TRANSPONDER BEACON AND MONITOR.
AD-609 810 DIV. 19

•NERVOUS SYSTEM
MODELS (SIMULATIONS)
APPLICATIONS OF A DIGITAL-COMPUTER SIMULATION OF A NEURAL NETWORK.
AD-609 681 DIV. 30

•NETWORKS
COMMUNICATION THEORY
EFFICIENCY OF A ROUTING SCHEME IN A MOBILE DATA PROCESSING COMMUNICATION NETWORK.
AD-609 774 DIV. 8

SYNTHESIS
REALIZATION OF BINARY SWITCHING FUNCTIONS WITH MAJORITY GATES.
AD-609 909 DIV. 7
ALGEBRAIC-GEOMETRIC TECHNIQUE FOR THE REALIZATION OF SWITCHING FUNCTIONS WITH M-OUT-OF-N DECISION GATES.
AD-609 905 DIV. 7

•NEUTRON SCATTERING
BROMINE
VIBRATIONAL LEVELS IN LIQUID BROMINE BY NEUTRON INELASTIC SCATTERING.
AD-609 678 DIV. 20

•NICKEL ALLOYS
HARDNESS
TRANSLATION OF RUSSIAN RESEARCH: INFLUENCE OF ALLOYING ON THE HARDNESS OF NIAI AND ITS SOLID SOLUTIONS.
AD-609 783 DIV. 17

MAGNETIC PROPERTIES
MAGNETIC PROPERTIES OF ELECTRODEPOSITED NICKEL-IRON-COBALT FILMS.
AD-609 829 DIV. 17

•NIOBIUM ALLOYS
DIFFUSION
DIFFUSION IN COLUMBIUM RICH COLUMBIUM-TITANIUM ALLOYS WITH CONSIDERATION OF THE POSSIBILITY THAT THE DIFFUSION COEFFICIENT IS TIME DEPENDENT.
AD-609 870 DIV. 17

RESISTANCE (ELECTRICAL)
ELECTRICAL RESISTIVITY OF NIOBIUM-ZIRCONIUM ALLOYS BELOW 273.2K.
AD-609 798 DIV. 17

•NITROGEN COMPOUNDS
IONOSPHERE
IONOSPHERIC PROCESSES AND NITRIC OXIDE.
AD-609 844 DIV. 2

•NITROGEN
EXCITATION
DISTORTED WAVE CALCULATION OF ROTATIONAL EXCITATION OF N2 BY SLOW ELECTRONS.
AD-609 837 DIV. 25

THERMODYNAMICS
THERMODYNAMIC PROPERTIES OF CARBON-NITROGEN MIXTURES AT HIGH TEMPERATURES.
AD-609 670 DIV. 25

•NOISE
SEISMOLOGICAL STATIONS
EFFECT OF CHANGING MULTIPLE ARRAY PROCESSOR OUTPUT FILTER BAND WIDTH.
AD-609 536 DIV. 2

•NONLINEAR SYSTEMS
MECHANICS
NON-LINEAR MECHANICS: THEORY OF RELAXATION OSCILLATIONS.
AD-609 701 DIV. 25

•NON-DESTRUCTIVE TESTING
MILITARY REQUIREMENTS
ELECTROMAGNETIC TEST CONTROL REQUIREMENTS.
AD-609 498 DIV. 20

TEST METHODS
QUALITY CONTROL BY NONDESTRUCTIVE TESTING METHODS.
AD-609 694 DIV. 26

•NOZZLES
CAVITATION
CRITICAL PRESSURES FOR THE INCEPTION OF CAVITATION IN A LARGE-SCALE NUMACHI NOZZLE AS INFLUENCED BY THE AIR CONTENT OF THE WATER.
AD-609 629 DIV. 9

•NUCLEAR EXPLOSIONS
UNDERGROUND EXPLOSIONS
ANALYSIS OF SHOAL DATA ON GROUND MOTION AND CONTAINMENT SAFETY PROGRAM.
AD-609 874 DIV. 20

•NUCLEAR SCATTERING
LIQUID METALS
DETERMINATION OF X-RAY SCATTERING FACTORS WITH LIQUID SPECIMENS.
AD-609 603 DIV. 20

•NUMERICAL ANALYSIS
BALLISTICS
ALGORITHMS FOR ESTIMATING A RE-ENTRY BODY'S POSITION, VELOCITY AND BALLISTIC COEFFICIENT IN REAL TIME OR FOR POST FLIGHT ANALYSIS.
AD-609 524 DIV. 12

INTEGRALS
SOLUTION OF THE INVISCID FLOW DUE TO DISPLACEMENT BY THE METHOD OF INTEGRAL RELATIONS.
AD-609 869 DIV. 9

N-BODY PROBLEM
RESEARCH IN THE RESTRICTED PROBLEMS OF THREE AND FOUR BODIES.
AD-609 613 DIV. 2

ORBITAL TRAJECTORIES
AN ANALYTICAL STUDY OF THE EFFECTS OF OBLATENESS ON SATELLITE ORBITS.
AD-609 919 DIV. 12

TRANSPORT PROPERTIES
CHOICE OF AN APPROPRIATE MEAN ABSORPTION COEFFICIENT FOR USE IN THE GENERAL GREY GAS EQUATIONS.
AD-609 838 DIV. 25

•NUMERICAL METHODS AND PROCEDURES
ERRORS
TRANSLATION OF RUSSIAN RESEARCH: THEORY OF ERROR OF THE RUNGE-KUTTA METHOD.
AD-609 656 DIV. 15

INTEGRATION
TRANSLATION OF RUMANIAN RESEARCH: RUNGE-KUTTA TYPE PROCEDURES OF ORDER OF ACCURACY N 4 (N > 2) WITH THREE NODES FOR NUMERICAL INTEGRATION OF FIRST-ORDER DIFFERENTIAL EQUATIONS.
AD-609 692 DIV. 19

MOTION
A LAGRANGIAN FINITE DIFFERENCE METHOD FOR TWO-DIMENSIONAL MOTION INCLUDING MATERIAL STRENGTH.
AD-609 523 DIV. 25

PROGRAMMING (COMPUTERS)
ATTRIBUTE DERIVATION AND DISPLAY SYSTEM FOR THE EXPERIMENTAL DYNAMIC PROCESSOR.
AD-609 488 DIV. 30

•NYLON
THERMODYNAMICS
THERMODYNAMICS OF POLYAMIDE RESINS (NYLON-6): C-H2O2-N2 VAPOR SYSTEM.
AD-609 882 DIV. 14

•N-BODY PROBLEM
HAMILTONIAN
RESEARCH IN THE RESTRICTED PROBLEMS OF THREE AND FOUR BODIES.
AD-609 613 DIV. 2

•OCEAN CURRENTS
MEASUREMENT
DEEP CURRENT MEASUREMENTS NORTH OF PUERTO RICO.
AD-609 853 DIV. 2

•OCEANOGRAPHIC DATA
ATLANTIC OCEAN
DEEP CURRENT MEASUREMENTS NORTH OF PUERTO RICO.
AD-609 853 DIV. 2

•OCEANOGRAPHIC EQUIPMENT
UNDERWATER EQUIPMENT
MANIPULATORS AND SPECIAL DEVICES FOR UNDERWATER USE.
AD-609 490 DIV. 2

•OCEANOLOGY
MEXICO GULF
NORTHEAST GULF OF MEXICO HYDROGRAPHIC SURVEY DATA COLLECTED IN 1963.
AD-609 714 DIV. 2

SCIENTIFIC RESEARCH
GENERAL OCEANOGRAPHY AND LONG RANGE RESEARCH.
AD-609 854 DIV. 2

TIDES
OBSERVATIONS OF TIDAL PERIODIC INTERNAL WAVES OVER A THREE DAY PERIOD OFF PANAMA CITY, FLORIDA.
AD-609 796 DIV. 2

•OPTICAL PHENOMENA
ELECTROMAGNETIC WAVE REFLECTIONS
STUDY OF A SCINTILLATION MECHANISM.
AD-609 848 DIV. 25

•OPTICAL PROPERTIES
MEASUREMENT

AD-609 847 DIV. 25

•OPTICAL TRACKING
AIRBORNE
PROGRESS REPORT ON HAYSTACK HILL ANTENNAS, LES, AND PRESS PROJECT.
AD-609 872 DIV. 9

•OPTIMIZATION
LINEAR SYSTEMS
ALGORITHM FOR SOLVING VOLTERRA INTEGRAL EQUATIONS MET IN PROCESS IDENTIFICATION.
AD-609 864 DIV. 15

•ORBITAL TRAJECTORIES
SATELLITES (ARTIFICIAL)
AN ANALYTICAL STUDY OF THE EFFECTS OF OBLATENESS ON SATELLITE ORBITS.
AD-609 919 DIV. 12

SIMULATION
ORBITAL FLIGHT AND COVERAGE SIMULATION.
AD-609 902 DIV. 12

•ORGANIC COMPOUNDS
SEMICONDUCTORS
ELECTRONICALLY FUNCTIONAL ORGANIC MATERIALS.
AD-609 831 DIV. 25

•ORGANIC NITROGEN COMPOUNDS
SMOKELESS PROPELLANTS
RESEARCH IN NITROMONOMERS AND THEIR APPLICATION TO SOLID SMOKELESS PROPELLANTS.
AD-609 852 DIV. 10

•ORGANOBORANES
OXIDATION
STUDIES OF LOW-TEMPERATURE OXIDATION REACTIONS.
AD-609 800 DIV. 4

•OSCILLATORS
MILLIMETER WAVES
RESEARCH ON MILLIMETER-WAVE GENERATION TECHNIQUES.
AD-609 625 DIV. 8

•PARTICLE TRAJECTORIES
ELECTRON GUNS
DIGITAL COMPUTER STUDIES OF ELECTRON GUNS.
AD-609 679 DIV. 8

•PARTICLES
GAS FLOW
DYNAMICS OF GAS-PARTICLE MIXTURES WITH FINITE PARTICLE VOLUME.
AD-609 598 DIV. 9

MEASUREMENT
CALCULATION OF EFFICIENCIES OF AEROSOL GENERATING DEVICES FROM FLUX MEASUREMENTS OBTAINED IN FIELD TRIALS.
AD-609 840 DIV. 3

•PASSENGER VEHICLES
SYSTEMS ENGINEERING
THE AUTOMOBILE-TODAY AND TOMORROW.
AD-609 753 DIV. 11
AUTOMOBILES; TODAY AND TOMORROW.
AD-609 757 DIV. 11

URBAN AREAS
ANALYSIS OF SOME LAND TRANSPORTATION VEHICLES -UTOMOBILE, BUS, AND RAILROAD CAR -TODAY AND TOMORROW.
AD-609 754 DIV. 11

•PATENTS
GLASS TEXTILES
GLASS/RESIN INTERFACE: PATENT SURVEY, PATENT LIST, AND GENERAL BIBLIOGRAPHY.
AD-609 526 DIV. 14

•PATTERN RECOGNITION
PHOTOINTERPRETATION
STUDY OF PICTORIAL DATA ANALYSIS CONCEPTS AND TECHNIQUES.
AD-609 711 DIV. 18

•PERFORMANCE TESTS
TRACKING
TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY AND LEARNING.
AD-609 811 DIV. 28

•PERFORMANCE (ENGINEERING)
ROCKET MOTORS (LIQUID PROPELLANT)
MONITORING OF ROCKET ENGINE PERFORMANCE BY SPECTROSCOPIC TECHNIQUES.
AD-609 492 DIV. 27

•PERFORMANCE (HUMAN)
MILITARY PERSONNEL
PERSONAL HISTORY CORRELATES OF MILITARY PERFORMANCE AT A LARGE ANTARCTIC STATION.
AD-609 542 DIV. 28

NAVAL PERSONNEL
PERFORMANCE EVALUATIONS OF ANTARCTIC VOLUNTEERS.
AD-609 946 DIV. 28

PERFORMANCE TESTS
EFFECTS OF GOAL DIFFICULTY ON PERFORMANCE: A FIELD EXPERIMENT.
AD-609 908 DIV. 28

STANDARDS
METHOD FOR DERIVING JOB STANDARDS FROM SYSTEM EFFECTIVENESS CRITERIA. VOLUME I. METHOD DEVELOPMENT.
AD-609 729 DIV. 23

•PERSONALITY
PSYCHOMETRICS
VARIABILITY IN FACTOR STRUCTURES OF CLINICIANS' PERSONALITY RATINGS.
AD-609 949 DIV. 28

•PERTURBATION THEORY
DRIFT
INFLUENCES OF SMALL DIFFERENCES IN BALLISTIC COEFFICIENT ON SATELLITE STATION KEEPING.
AD-609 880 DIV. 12

ORBITAL TRAJECTORIES
FIRST ORDER OBLATENESS PERTURBATIONS AND THE U. S. NAVAL SPACE SURVEILLANCE SYSTEM.
AD-609 566 DIV. 6

•PETN
IGNITION
INITIATION OF EXPLOSIVES BY EXPLODING WIRES. V. EFFECT OF WIRE MATERIAL ON THE INITIATION OF PETN BY EXPLODING WIRES.
AD-609 449 DIV. 22

•PETROGRAPHY
MOON
TRANSLATION OF RUSSIAN RESEARCH: PETROGRAPHIC INVESTIGATION OF THE LUNAR SURFACE BY JOINT USE OF PHOTOMETRIC AND COLORIMETRIC OBSERVATIONS.
AD-609 693 DIV. 2

•PHASE SHIFTERS
FERROMAGNETIC MATERIALS
FERRITE PHASE SHIFTERS AT C AND X BAND.
AD-609 813 DIV. 8

•PHASE SHIFTER
FERRITES
DIGITAL FERRITE PHASE SHIFTER. A STUDY OF THE DIFFERENTIAL PHASE SHIFT IN CIRCULAR CYLINDRICAL WAVEGUIDES CONTAINING CIRCUMFERENTIALLY MAGNETIZED FERRITE RODS AND TUBES UNDER TRANSVERSE ELECTRIC MODE EXCITATION.
AD-609 495 DIV. 8

•PHONONS
DIELECTRICS
SOME RECENT ADVANCES IN MICROWAVE PHONON GENERATION AND DETECTION WITH APPLICATIONS TO THE STUDY OF PHONON-LATTICE INTERACTIONS IN DIELECTRIC MATERIALS.
AD-609 479 DIV. 25

•PHOSPHATE GLASS
INFRARED SPECTROSCOPY
INFRARED SPECTRA OF METAPHOSPHATE GLASSES.
AD-609 606 DIV. 14

•PHOTOELASTICITY
DELAY LINES
MULTIPLE TAPPED PHOTOELASTIC DELAY LINE.
AD-609 979 DIV. 25

•PHOTOELECTRIC MATERIALS
TAPES
RESEARCH AND DEVELOPMENT ON PHOTOCONDUCTIVE PHOTOTAPE.
AD-609 768 DIV. 24

•PHOTOGRAPHIC ANALYSIS
ELECTRONIC EQUIPMENT
STUDY OF PICTORIAL DATA ANALYSIS CONCEPTS AND TECHNIQUES.
AD-609 711 DIV. 18

•PHOTOINTERPRETATION
PATTERN RECOGNITION
STUDY OF PICTORIAL DATA ANALYSIS CONCEPTS AND TECHNIQUES.
AD-609 711 DIV. 18

•PHYSIOLOGY
RESPIRATORS
HUMAN BREATHING PARAMETERS AND COMMERCIAL AUTOMATIC RESPIRATORS.
AD-609 732 DIV. 16

•PITOT TUBES
STAGNATION POINT
UNCOOLED, RAPID RESPONSE PROBE FOR MEASURING STAGNATION PRESSURES IN HIGH VELOCITY ARC PLASMA.
AD-609 621 DIV. 25

•PLANETS
BRIGHTNESS
PHYSICAL RESEARCHES ON THE BRIGHTER PLANETS.
AD-609 947 DIV. 2

ELLIPSOIDS
AN ANALYTICAL STUDY OF THE EFFECTS OF OBLATENESS ON SATELLITE ORBITS.
AD-609 519 DIV. 12

•PLANTS (BOTANY)
GENETICS
NOTE ON REPEATED SELECTION IN THE NORMAL CASE.
AD-609 469 DIV. 32

MICROMETEOROLGY
VERTICAL FLUXES WITHIN THE VEGETATIVE CANOPY OF A CORN FIELD.
AD-609 790 DIV. 2

•PLASMA ENGINES
SPACE PROPULSION
SPACE PROPULSION BY PLASMA ACCELERATION TECHNIQUES.
AD-609 833 DIV. 27

•PLASMA JETS
CALIBRATION
CALIBRATION OF A PLASMA JET FACILITY FOR SIMULATION OF BALLISTIC MISSILE RE-ENTRY.
AD-609 593 DIV. 12

MEASUREMENT
ANALYTICAL-EXPERIMENTAL CORRELATION OF RADIATION LOSS FROM AN ARGON ARCJET.
AD-609 722 DIV. 25

THERMAL PROPERTIES
THERMAL CHARACTERISTICS OF A HIGH AND LOW MASS FLUX ARGON PLASMA JET.
AD-609 622 DIV. 25

•PLASMA MEDIUM
ACCELERATION
INDUCTIVE PLASMA ACCELERATION RESEARCH.
AD-609 728 DIV. 27

•PLASMA MEDIUM
ACCELERATION
RESEARCH ON ELECTROMAGNETIC PLASMA ACCELERATION.
AD-609 982 DIV. 25
SPACE PROPULSION BY PLASMA ACCELERATION TECHNIQUES.
AD-609 833 DIV. 27

ELECTRICAL CONDUCTANCE
A. C. SOLENOID OF FINITE LENGTH IN A CONDUCTING MEDIUM WITH HALL CONDUCTIVITY.
AD-609 962 DIV. 25

INDUCTION HEATING
INDUCTIVE PLASMA HEATING USING A MULTI-TURN COIL.
AD-609 834 DIV. 25

IONIZATION
TRANSLATION OF JAPANESE RESEARCH: ON THE STEADY STATE OF IONIZATION IN WEAKLY IONIZED PLASMA IN THE NON EQUILIBRIUM STATE.
AD-609 939 DIV. 25

RELATIVITY THEORY
BASIC EQUATIONS OF THE RELATIVISTIC TEST PARTICLE PROBLEM.
AD-609 590 DIV. 25

STAGNATION POINT
UNCOOLED, RAPID RESPONSE PROBE FOR MEASURING STAGNATION PRESSURES IN HIGH VELOCITY ARC PLASMA.
AD-609 621 DIV. 25

•PLASMA SHEATH
ELECTRIC FIELDS
STUDY OF THE PLASMA BOUNDARY.
AD-609 967 DIV. 25

•PLASTICS
CRYOGENICS
CRYOGENIC MATERIALS DATA HANDBOOK.
AD-609 962 DIV. 25

FILAMENT WOUND CONSTRUCTION
ANALYSIS OF GLASS REINFORCED PLASTICS FOR HYDROSPACE APPLICATIONS.
AD-609 708 DIV. 14

•PNEUMATIC SERVOMECHANISMS
FLIGHT CONTROL SYSTEMS
BASIC APPLIED RESEARCH IN FLUID POWER CONTROL.
AD-609 652 DIV. 12

•POLAR REGIONS
ADAPTATION (PHYSIOLOGY)
TRANSLATION OF RUSSIAN RESEARCH: CERTAIN PHYSIOLOGICAL SHIFTS IN THE HUMAN ORGANISM DURING ACCLIMATIZATION IN THE INTRACONTINENTAL REGIONS OF ANTARCTICA.
AD-609 790 DIV. 16

•POLITICAL SCIENCE
INDONESIA
GANEFO I: SPORTS AND POLITICS IN DJAKARTA.
AD-609 659 DIV. 32

•POLYESTER PLASTICS
CHROMATOGRAPHIC ANALYSIS
DETERMINATION OF STYRENE MONOMER IN POLYESTER RESINS BY GAS-LIQUID CHROMATOGRAPHY.
AD-609 664 DIV. 4

•POLYETHYLENE PLASTICS
FRACTURE (MECHANICS)
COMPARISON OF EXTENDED POLYETHYLENE AND CHRYSOTILE ASBESTOS FRACTURE SURFACES.
AD-609 608 DIV. 14

MECHANICAL PROPERTIES
MULTIPLE INTEGRAL REPRESENTATION OF MECHANICAL BEHAVIOR OF POLYETHYLENE.
AD-609 657 DIV. 14

•POLYMERIZATION
CATALYSIS
MODELS FOR ASYMMETRIC INDUCTION IN POLYMERIZATION.
AD-609 598 DIV. 4

•POSITIONING DEVICES (MACHINERY)
UNDERWATER EQUIPMENT
MANIPULATORS AND SPECIAL DEVICES FOR UNDERWATER USE.
AD-609 490 DIV. 2

•POWDER METALLURGY
MECHANICAL WORKING
PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
AD-609 686 DIV. 8

•POWER AMPLIFIERS
TRANSISTORS
PRODUCTION ENGINEERING MEASURE, TRANSISTOR, VHF, SILICON, POWER (5W-70MC).
AD-609 741 DIV. 8

•POWER SERIES
MAGNETOHYDRODYNAMICS
EXTENSION OF THE M2- AND THE THIN-WING EXPANSION METHODS TO MAGNETOHYDRODYNAMICS.
AD-609 968 DIV. 9

•POWER SUPPLIES
TRANSISTORS
A FIXED-VOLTAGE POWER SUPPLY FOR TRANSISTOR CIRCUITS.
AD-609 447 DIV. 8

•PRESSURE SUITS
ASTRONAUTS
MOMENTS OF INERTIA AND CENTERS OF GRAVITY OF THE LIVING HUMAN BODY ENCUMBERED BY A FULL-PRESSURE SUIT.
AD-609 863 DIV. 16

•PRESSURE VESSELS
COMPOSITE MATERIALS
ANALYSIS OF GLASS REINFORCED PLASTICS FOR HYDROSPACE APPLICATIONS.
AD-609 708 DIV. 14

STEEL
YANKEE REACTOR PRESSURE VESSEL SURVEILLANCE: EVALUATION OF SPECIMENS EXPOSED DURING THE SECOND CORE.
AD-609 569 DIV. 20

•PRESSURE
HYPERSONIC FLOW
PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR MACH 21 FLOWS OVER A BLUNT PYRAMIDAL CONFIGURATION WITH AERODYNAMIC CONTROLS. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS.
AD-609 559 DIV. 9

•PROBABILITY
GAME THEORY
PREFERENCE, CREDENCE, AND UTILITY.
AD-609 560 DIV. 19

•PROBES (ELECTROMAGNETIC)
DIPOLE ANTENNAS
CONDUCTIVITY MEASUREMENTS IN DISSIPATIVE MEDIA WITH ELECTRICALLY SHORT PROBES.
AD-609 684 DIV. 2

•PROGRAMMING LANGUAGES
COMPILERS
TECHNIQUES FOR AUTOMATING THE CONSTRUCTION OF TRANSLATORS (ASSEMBLERS, INTERPRETERS, COMPILERS) FOR PROGRAMMING LANGUAGES.
AD-609 487 DIV. 30

•PROGRAMMING (COMPUTERS)
COMMAND AND CONTROL SYSTEMS
THE ROLE OF SIMULATION AND DATA REDUCTION PROGRAMS IN THE DEVELOPMENT OF REAL-TIME SYSTEMS.
AD-609 500 DIV. 30

EDUCATION
A DESCRIPTIVE LIST OF PLATO LESSON PROGRAMS, 1960-1964.
AD-609 699 DIV. 23

GAME THEORY
A HEURISTIC APPROACH TO SOLUTION OF CHECKERBOARD PUZZLES.
AD-609 970 DIV. 30

HEAT TRANSFER
COMPUTER ANALYSIS OF THE HEAT FLOW IN THE VACUUM ARC MELTING OF MOLYBDENUM.
AD-609 691 DIV. 17

NUMERICAL METHODS AND PROCEDURES
ATTRIBUTE DERIVATION AND DISPLAY SYSTEM FOR THE EXPERIMENTAL DYNAMIC PROCESSOR.
AD-609 488 DIV. 30

•PROPELLANT BURN-OUT
ENERGY
THE EFFECT OF PROPELLANT ENERGY AND MASS DISTRIBUTION ON ROCKET PROPULSION EFFICIENCY.
AD-609 513 DIV. 27

•PROPELLANT GRAINS
STRESSES
STRESS ANALYSIS OF A CYLINDER PRESSURE-LOADED OVER EQUAL AND OPPOSITE ARCS.
AD-609 640 DIV. 29

•PROPORTIONAL NAVIGATION
CALCULUS OF VARIATIONS
DIFFERENTIAL GAMES AND OPTIMAL PURSUIT-EVASION STRATEGIES.
AD-609 772 DIV. 19

•PROPULSION
LABORATORIES
MORRIS DAM MARINE PROPULSION LABORATORY.
AD-609 819 DIV. 27

•PROTECTIVE MASKS
TEST METHODS
DYNAMIC MEASUREMENTS OF COMPARTMENT PRESSURE AND RESPIRATORY FLOW CONDITIONS WITHIN A PROTECTIVE MASK.
AD-609 982 DIV. 3

•PSYCHOACOUSTICS
ADAPTATION (PHYSIOLOGY)
LATERALIZATION OF SOUNDS AT THE UNSTIMULATED EAR OPPOSITE TO A NOISE-ADAPTED EAR.
AD-609 456 DIV. 28

DETECTION
DETECTION OF MARKOVIAN SEQUENCES OF SIGNALS.
AD-609 457 DIV. 28

•PSYCHOLOGY
LANGUAGE
STUDIES IN BEHAVIORAL ASPECTS OF GRAMMAR AND SEMANTICS.
AD-609 807 DIV. 28

SLEEP
PSYCHOLOGICAL CORRELATES OF PLATEAU SYPNOTIZABILITY IN A SPECIAL VOLUNTEER SAMPLE.
AD-609 713 DIV. 28

•PSYCHOMETRICS
AUDITORY PERCEPTION
DETECTION OF MARKOVIAN SEQUENCES OF SIGNALS.
AD-609 457 DIV. 28

FACTOR ANALYSIS
LATENT STRUCTURE FOR THE SIMPLEX: PSYCHOMETRIC METHODS.
AD-609 676 DIV. 28

MILITARY PERSONNEL
PERSONAL HISTORY CORRELATES OF MILITARY PERFORMANCE AT A LARGE ANTARCTIC STATION.
AD-609 542 DIV. 28

NAVAL PERSONNEL
PERFORMANCE EVALUATIONS OF ANTARCTIC VOLUNTEERS.
AD-609 546 DIV. 28

STANDARDS
VARIABILITY IN FACTOR STRUCTURES OF CLINICIANS' PERSONALITY RATINGS.
AD-609 949 DIV. 28

TEACHING MACHINES
EVALUATION OF TRAINING DEVICES EMPLOYING MULTIPLE TRACKS IN A LINEAR PROGRAM.
AD-609 801 DIV. 23
LEARNING SET FORMATION IN PROGRAMMED INSTRUCTION.
AD-609 802 DIV. 23

TEST CONSTRUCTION (PSYCHOLOGY)
PSYCHOLOGICAL MEASUREMENT AND PREDICTION. PART III, THE STRUCTURE OF TESTS.
AD-609 516 DIV. 28

•PULSE COMPRESSION
FILTERS (ELECTROMAGNETIC WAVE)
EFFECTS OF MISMATCH AND DISTORTION ON THE OUTPUT SIGNAL OF A LINEAR FM PULSE-COMPRESSION FILTER.
AD-609 478 DIV. 8

•QUALITY CONTROL
MATHEMATICAL MODELS
MARKOVIAN DECISION MODELS FOR REJECT ALLOWANCE PROBLEMS.
AD-609 677 DIV. 26

NON-DESTRUCTIVE TESTING
QUALITY CONTROL BY NONDESTRUCTIVE TESTING METHODS.
AD-609 694 DIV. 26

•QUARTZ
CRYSTAL FILTERS
PEM QUARTZ CRYSTAL UNITS, FILTER LOW FREQUENCY, 1MC TO 10MC TYPES CR-(XM-49)/U THRU CR-(XM-52)/U.
AD-609 463 DIV. 8

RADIOFREQUENCY FILTERS
UPPER-SIDEBAND (1.75-MC) QUARTZ CRYSTAL FILTER TYPE EL-FR (X-1): PRODUCTION ENGINEERING MEASURE.
AD-609 716 DIV. 8

•RADAR DUPLEXERS
TRANSMIT-RECEIVE TUBES
RUGGEDIZED MICROWAVE DUPLEXING TUBES: PRODUCTION ENGINEERING MEASURES PROGRAM.
AD-609 761 DIV. 8

•RADAR ECHO AREAS
CONICAL BODIES
THE BORN APPROXIMATION APPLIED TO ELECTROMAGNETIC SCATTERING FROM A FINITE CONE.
AD-609 729 DIV. 29

HYPERSONIC FLOW
RADAR CROSS SECTION OF AN IONIZED WAKE OF A HYPERSONIC BODY.
AD-609 512 DIV. 6

•RADAR EQUIPMENT
GUIDED MISSILE RANGES
AN/FPA-22(XW-1), AN/FPA-23(XW-1), L/UHF-BAND PENCIL BEAM RADARS.
AD-609 623 DIV. 6

•RADAR INTERFERENCE
ATMOSPHERE
PROJECT WIDE BAND.
AD-609 619 DIV. 6

•RADAR REFLECTIONS
MEASUREMENT
RADAR DATA MEASURING SYSTEM FOR AIRCRAFT SIGNAL ENERGY RETURNS.
AD-609 497 DIV. 19

•RADAR TRACKING
TARGET RECOGNITION
AN/FPA-22(XW-1), AN/FPA-23(XW-1), L/UHF-BAND PENCIL BEAM RADARS.
AD-609 623 DIV. 6

•RADIATION CHEMISTRY
ALIPHATIC COMPOUNDS
RADIATION CHEMISTRY OF ACETYLENIC COMPOUNDS.
AD-609 440 DIV. 4

•RADIATION DAMAGE
STEEL
YANKEE REACTOR PRESSURE VESSEL SURVEILLANCE: EVALUATION OF SPECIMENS EXPOSED DURING THE SECOND CORE.
AD-609 569 DIV. 20

•RADIATION EFFECTS
RADIOACTIVE FALLOUT
CONSEQUENCES OF INGESTION BY MAN OF REAL AND SIMULATED FALLOUT.
AD-609 629 DIV. 16

•RADIO ASTRONOMY
MILLIMETER WAVES
ELECTRONICS RESEARCH PROGRAM. RESEARCH AND EXPERIMENTATION ON SPACE APPLICATIONS OF MILLIMETER WAVES.
AD-609 594 DIV. 8

SOLAR DISTURBANCES
A COLLATION STUDY OF A HIGHLY MAGNETIC PERIOD (SEPTEMBER 20-23, 1963).
AD-609 862 DIV. 2

SOLAR RADIATION
VERY LOW FREQUENCY ENVELOPE SPECTRA OF SOLAR RADIO BURSTS.
AD-609 861 DIV. 2

•RADIO COMMUNICATION SYSTEMS
RADIO FREQUENCY
TRANSLATION OF RUSSIAN ARTICLE ON USE OF A DIGITAL COMPUTER FOR CALCULATION OF MAXIMUM APPLICABLE FREQUENCIES FOR COMMUNICATION BETWEEN TWO POINTS.
AD-609 794 DIV. 8

•RADIO FREQUENCY
DETERMINATION
TRANSLATION OF RUSSIAN ARTICLE ON USE OF A DIGITAL COMPUTER FOR CALCULATION OF MAXIMUM APPLICABLE FREQUENCIES FOR COMMUNICATION BETWEEN TWO POINTS.
AD-609 794 DIV. 8

•RADIO NAVIGATION
AIR FORCE
CIRCUITRY FOR INTEGRATING COMPONENTS INTO SOLID-STATE TACAN TRANSPONDER BEACON AND MONITOR.
AD-609 810 DIV. 19

•RADIO RECEIVERS
PROTECTIVE MASKS
DYNAMIC MEASUREMENTS OF COMPARTMENT PRESSURE AND RESPIRATORY FLOW CONDITIONS WITHIN A PROTECTIVE MASK.
AD-609 982 DIV. 3

•RADIO TRANSMISSION
EXTREMELY LOW FREQUENCY
EXPERIMENTAL RESEARCH INVESTIGATION OF EXTREMELY LOW FREQUENCY PROPAGATION.
AD-609 719 DIV. 8

•RADIO TRANSMITTERS
PROTECTIVE MASKS
DYNAMIC MEASUREMENTS OF COMPARTMENT PRESSURE AND RESPIRATORY FLOW CONDITIONS WITHIN A PROTECTIVE MASK.
AD-609 982 DIV. 3

•RADIO WAVES
ATMOSPHERIC REFRACTION
MODEL OF ATMOSPHERIC REFRACTIVITY AND THEORETICAL HEIGHTS OF RADIO-RADAR RAYS FOR MIAMI, FLORIDA.
AD-609 921 DIV. 8

•RADIOACTIVE FALLOUT
SOIL MECHANICS
MIGRATION OF FUSED FALLOUT SIMULANT INTO SOILS.
AD-609 698 DIV. 20

•RADIOBIOLOGY
SPACE ENVIRONMENTAL CONDITIONS
VULNERABILITY OF MANNED ORBITAL COMMAND POSTS TO NATURAL SPACE RADIATIONS.
AD-609 901 DIV. 12

•RADIOFREQUENCY FILTERS
MANUFACTURING METHODS
UPPER-SIDEBAND (1.75-MC) QUARTZ CRYSTAL FILTER TYPE EL-FR (X-1): PRODUCTION ENGINEERING MEASURE.
AD-609 716 DIV. 8

MICROWAVE NETWORKS
BRIDGED 'T' REJECTION FILTERS.
AD-609 479 DIV. 8

•RADIOFREQUENCY GENERATORS
SEMICONDUCTOR DEVICES
SOLID-STATE GENERATOR.
AD-609 679 DIV. 8

•RADIOFREQUENCY INTERFERENCE
TEST EQUIPMENT
BRIDGED 'T' REJECTION FILTERS.
AD-609 479 DIV. 8

•RADIOFREQUENCY OSCILLATORS
TIMING DEVICES
USAEL PRIMARY FREQUENCY STANDARDS.
AD-609 795 DIV. 8

•RADIOFREQUENCY
STANDARDS
USAEL PRIMARY FREQUENCY STANDARDS.
AD-609 795 DIV. 8

•RADIOGRAPHY
GRAPHITE
RADIOGRAPHIC TECHNIQUES OF GRAPHIC EVALUATION.
AD-609 877 DIV. 30

•RAILROAD CARS
URBAN AREAS
ANALYSIS OF SOME LAND TRANSPORTATION VEHICLES -UTOMOBILE, BUS, AND RAILROAD CAR -TODAY AND TOMORROW.
AD-609 754 DIV. 11

•RANGE FINDING
LASERS
LASER ACTIVITIES AND BACKGROUND RADIATION STUDIES.
AD-609 759 DIV. 29

OPTICAL EQUIPMENT
TRANSLATION OF RUSSIAN PATENT: METHOD OF MEASURING DISTANCE BASED ON THE USE OF A LIGHT RANGE METER WITH AN ACTIVE REFLECTOR.
AD-609 789 DIV. 2

•RANGES (ESTABLISHMENTS)
UNDERWATER BALLISTICS
MORRIS DAM BALLISTIC RANGE. UNDERWATER ORDNANCE TEST FACILITY.
AD-609 822 DIV. 30

UNDERWATER ORDNANCE
LONG BEACH SEA RANGE. UNDERWATER ORDNANCE TEST FACILITY.
AD-609 824 DIV. 30

•RARE EARTHS
NUCLEAR PHYSICS
RARE EARTH IONS IN CRYSTALLINE FIELDS.
AD-609 541 DIV. 20

•REACTION KINETICS
MONITORS
SHOCK TUBE WITH QUADROPOLE MASS FILTER FOR MONITORING HIGH-TEMPERATURE REACTION KINETICS.
AD-609 775 DIV. 30

•READING MACHINES
LANGUAGE
STUDIES IN BEHAVIORAL ASPECTS OF GRAMMAR AND SEMANTICS.
AD-609 807 DIV. 28

•RECOVERY
SPACECRAFT
OPTIMIZATION OF RECOVERY TRAJECTORIES FOR SPACE VEHICLES.
AD-609 973 DIV. 12

•RECREATION
INDONESIA
GANEFO I: SPORTS AND POLITICS IN DJAKARTA.
AD-609 659 DIV. 32

•RECTANGULAR BODIES
THERMAL CONDUCTIVITY
STABILITY CRITERIA OF EXPLICIT DIFFERENCE SCHEMES FOR CERTAIN HEAT CONDUCTION PROBLEMS WITH UNCOMMON BOUNDARY CONDITIONS.
AD-609 738 DIV. 25

•REENTRY VEHICLES
CERAMIC MATERIALS
SLIP-CAST FUSED SILICA.
AD-609 667 DIV. 12

FLUID DYNAMIC PROPERTIES
RE-ENTRY PHYSICS RESEARCH: AERODYNAMIC PHENOMENA ASSOCIATED WITH REENTRY VEHICLES.
AD-609 736 DIV. 9

RECOVERY
OPTIMIZATION OF RECOVERY TRAJECTORIES FOR SPACE VEHICLES.
AD-609 973 DIV. 12

STAGNATION POINT
CALIBRATION OF A PLASMA JET FACILITY FOR SIMULATION OF BALLISTIC MISSILE RE-ENTRY.
AD-609 593 DIV. 12

•REFLECTION
OPTICAL PROPERTIES

AD-609 847 DIV. 25

•REFRACTORY METAL ALLOYS
MECHANICAL FASTENERS
REFRACTORY METAL ALLOY FASTENERS.
AD-609 653 DIV. 26

•REFRACTORY METALS AND ALLOYS
MATERIAL FORMING
REFRACTORY ALLOY SHEET MATERIALS.
AD-609 818 DIV. 17

•RELATIVITY THEORY
EQUATIONS
BASIC EQUATIONS OF THE RELATIVISTIC TEST PARTICLE PROBLEM.
AD-609 990 DIV. 25

•RELAXATION OSCILLATORS
THEORY
NON-LINEAR MECHANICS: THEORY OF RELAXATION OSCILLATIONS.
AD-609 701 DIV. 25

•RELIABILITY (ELECTRONICS)
SWITCHING CIRCUITS
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 705 DIV. 8
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 745 DIV. 8

TRANSISTORS
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND TO INSURE THE RELIABILITY OF THE C400 SERIES FIELD EFFECT TRANSISTORS.
AD-609 596 DIV. 8
ELECTRONIC PARTS-ACCELERATED LIFE TESTS.
AD-609 808 DIV. 8

•RENDEZVOUS SPACECRAFT
SIMULATORS
DESIGN AND OPERATION OF A SPACE RENDEZVOUS SIMULATOR.
AD-609 748 DIV. 12

•RENDEZVOUS TRAJECTORIES
ERRORS
ERROR ANALYSIS CONSIDERATIONS FOR A SATELLITE RENDEZVOUS.
AD-609 984 DIV. 12

•RESEARCH PROGRAM ADMINISTRATION
BIBLIOGRAPHY
SELECTIVE AND ANNOTATED BIBLIOGRAPHY ON RESEARCH, DEVELOPMENT, TESTING AND EVALUATION OF MILITARY ITEMS.
AD-609 539 DIV. 13

NAVAL RESEARCH
ONR POLICY ON RESEARCH.
AD-609 646 DIV. 30

•RESISTANCE (ELECTRICAL)
NIOBIUM ALLOYS
ELECTRICAL RESISTIVITY OF NIOBIUM-ZIRCONIUM ALLOYS BELOW 273.2K.
AD-609 798 DIV. 17

•RESISTORS
MANUFACTURING METHODS
PRODUCTION ENGINEERING
MEASURES FOR HIGH RELIABILITY, FIXED, FILM, PRECISION RESISTORS.
AD-609 602 DIV. 8
PRECISION VOLUME RESISTOR.
AD-609 623 DIV. 8

•RESONATORS
MIRRORS
ANALYSIS OF PERTURBED CONFOCAL RESONATORS.
AD-609 769 DIV. 25

•RESPIRATORS
DESIGN
HUMAN BREATHING PARAMETERS AND COMMERCIAL AUTOMATIC RESPIRATORS.
AD-609 732 DIV. 16

•RETINA
PHOTOSENSITIVITY
RETINAL SENSITIVITY DURING PHOTOPIC ADAPTATION.
AD-609 511 DIV. 16

•RE-ENTRY VEHICLES
RADAR TRACKING
ALGORITHMS FOR ESTIMATING A RE-ENTRY BODY'S POSITION, VELOCITY AND BALLISTIC COEFFICIENT IN REAL TIME OR FOR POST FLIGHT ANALYSIS.
AD-609 529 DIV. 12

•RINGS
COMPRESSIVE PROPERTIES
STUDIES ON THE INSTABILITY OF CIRCULAR RINGS.
AD-609 503 DIV. 13

•ROCK (GEOLOGY)
ELECTRICAL CONDUCTANCE
INVESTIGATIONS OF ELECTRICAL CHARACTERISTICS OF THE SUB SURFACE ROCK MEDIUM IN ESSEX COUNTRY, NEW YORK.
AD-609 683 DIV. 2

•ROCKET MOTOR NOZZLES
CARBON
CASTABLE CARBON FOR NOZZLE APPLICATIONS.
AD-609 607 DIV. 27

•ROCKET MOTORS (LIQUID PROPELLANT)
LIQUID LEVEL GAGES
APPLICATION OF RADIOISOTOPE LIQUID LEVEL GAGES AT THE AIR FORCE ROCKET PROPULSION LABORATORY.
AD-609 836 DIV. 27

MONITORS
MONITORING OF ROCKET ENGINE PERFORMANCE BY SPECTROSCOPIC TECHNIQUES.
AD-609 492 DIV. 27

•ROCKET PROPELLANT GRAINS
THERMAL STRESSES
THERMAL GRAIN STRUCTURAL ANALYSIS.
AD-609 747 DIV. 10

•ROCKET PROPELLANTS
COMBUSTION
GENERAL METHOD FOR CALCULATING EQUILIBRIUM CONCENTRATIONS OF COMBUSTION PRODUCTS OF HIGH ENERGY FUELS.
AD-609 592 DIV. 10
KINETIC STUDY OF ROCKET EXHAUST GASES. STUDY OF RADIATION EMITTED BY MODIFIED AND UNMODIFIED PROPELLANT SYSTEM.
AD-609 600 DIV. 10

•ROCKET PROPULSION
EFFECTIVENESS
THE EFFECT OF PROPELLANT ENERGY AND MASS DISTRIBUTION ON ROCKET PROPULSION EFFICIENCY.
AD-609 513 DIV. 27

•ROTATION
DIATOMIC MOLECULES
DISTORTED WAVE CALCULATION OF ROTATIONAL EXCITATION OF N2 BY SLOW ELECTRONS.
AD-609 837 DIV. 25

•SANDWICH CONSTRUCTION
CYLINDRICAL BODIES
EFFECT OF EXTERNAL OR INTERNAL STATIC PRESSURE ON THE NATURAL FREQUENCIES OF UNSTIFFENED,CROSS STIFFENED, AND SANDWICH CYLINDRICAL SHELLS.
AD-609 635 DIV. 25

•SANDWICH PANELS
HONEYCOMB CORES
METHOD FOR PREDICTING THERMAL RESPONSE IN SANDWICH PANELS.
AD-609 506 DIV. 13

•SATELLITE ANTENNAS
SYSTEMS ENGINEERING
DESIGN APPROACHES FOR SATELLITE ANTENNAS.
AD-609 616 DIV. 8

•SATELLITES (ARTIFICIAL)
LOW-ORBIT TRAJECTORIES
INFLUENCES OF SMALL DIFFERENCES IN BALLISTIC COEFFICIENT ON SATELLITE STATION KEEPING.
AD-609 880 DIV. 12

ORBITAL TRAJECTORIES
FIRST ORDER OBLATENESS PERTURBATIONS AND THE U. S. NAVAL SPACE SURVEILLANCE SYSTEM.
AD-609 966 DIV. 6

RENDEZVOUS TRAJECTORIES
ERROR ANALYSIS CONSIDERATIONS FOR A SATELLITE RENDEZVOUS.
AD-609 489 DIV. 12

TEMPERATURE CONTROL
THERMAL DESIGN TESTS OF THE IGY SATELLITE. (PAYLOAD FOR MISSILE NO. 16).
AD-609 491 DIV. 12

•SCIENTIFIC PERSONNEL
PERFORMANCE (HUMAN)
INFORMATION AND SCIENTIFIC CREATIVITY.
AD-609 486 DIV. 28

•SCIENTIFIC RESEARCH
AIR FORCE
U. S. AIR FORCE ACHIEVEMENTS IN RESEARCH.
AD-609 830 DIV. 30

BIBLIOGRAPHIES
PROFESSIONAL PAPERS CLEARED FOR POSSIBLE PUBLICATION AND/OR PRESENTATION.
AD-609 569 DIV. 30

INFORMATION RETRIEVAL
ROLE OF THE TECHNICAL LIBRARY IN SUPPORT OF AN INFORMATION CENTER.
AD-609 825 DIV. 32

REVIEWS
FOREIGN SCIENCE BULLETIN, 1969, VOL. 1, NO. 1.
AD-609 580 DIV. 30

•SCIENTIFIC SATELLITES
TEMPERATURE CONTROL
THERMAL DESIGN TESTS OF THE IGY SATELLITE. (PAYLOAD FOR MISSILE NO. 16).
AD-609 491 DIV. 12

•SEISMIC WAVES
NUCLEAR EXPLOSIONS
ANALYSIS OF SHOAL DATA ON GROUND MOTION AND CONTAINMENT SAFETY PROGRAM.
AD-609 879 DIV. 20

•SEISMOGRAPHS
CALIBRATION
STUDY OF AUTOMATIC CALIBRATION OF SEISMOGRAPH SYSTEMS.
AD-609 930 DIV. 2

PERFORMANCE (ENGINEERING)
EVALUATION TESTS, NATIONAL GEOPHYSICAL COMPANY SEISMOMETER TYPE 21.
AD-609 529 DIV. 2

•SEISMOLOGY
INFORMATION RETRIEVAL
AUTOMATED BULLETIN AND SEISMIC DATA RETRIEVAL SYSTEM.
AD-609 528 DIV. 2

INSTRUMENTATION
EVALUATION OF THE MULTIPLE ARRAY PROCESSOR IN DETECTING P-WAVE MOTION AT THE T.F.S.O.
AD-609 933 DIV. 2
EFFECT OF CHANGING MULTIPLE ARRAY PROCESSOR OUTPUT FILTER BAND WIDTH.
AD-609 936 DIV. 2
TONTO FOREST SEISMOLOGICAL OBSERVATORY. LINEAR ARRAY PROGRESS.
AD-609 938 DIV. 2

MONITORS
LARGE APERTURE SEISMIC ARRAY.
AD-609 891 DIV. 6

RECORDING SYSTEMS
EVALUATION OF B AND D SUMMATION TRACES AT THE TONTO FOREST SEISMOLOGICAL OBSERVATORY.
AD-609 931 DIV. 2
INVESTIGATION OF SYSTEM RESPONSE AS A FUNCTION OF AZIMUTH FROM TONTO FOREST SEISMOLOGICAL OBSERVATORY.
AD-609 932 DIV. 2

THUNDERSTORMS
EFFECTS OF THUNDERSTORMS ON SEISMOLOGICAL OPERATIONS, 1969.
AD-609 937 DIV. 2

•SEMICONDUCTING FILMS
SILANES
COMPATIBLE ACTIVE THIN-FILM INTEGRATED STRUCTURES.
AD-609 961 DIV. 8

•SEMICONDUCTOR DEVICES
INTEGRATED CIRCUITS
OPTOELECTRONIC FUNCTIONAL ELECTRONIC BLOCKS.
AD-609 909 DIV. 8

MICROWAVE OSCILLATOR
RESEARCH ON MILLIMETER-WAVE GENERATION TECHNIQUES.
AD-609 625 DIV. 8

PRODUCTION
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES 2N599-2N1099.
AD-609 992 DIV. 8
PRODUCTION ENGINEERING MEASURE: MECHANIZATION OF SEMICONDUCTOR DEVICES.
AD-609 922 DIV. 8

RADIOFREQUENCY GENERATORS
SOLID-STATE GENERATOR.
AD-609 679 DIV. 8

TUNNEL DIODES
INVESTIGATION OF SOLID STATE DEVICES AND CIRCUITS.
AD-609 674 DIV. 8

•SEMICONDUCTORS
METALORGANIC COMPOUNDS
TRANSLATION OF RUSSIAN RESEARCH: ELECTRIC AND MAGNETIC PROPERTIES OF THERMALLY TREATED FERROCENE BASE POLYMERS.
AD-609 782 DIV. 4

ORGANIC COMPOUNDS
TRANSLATION OF RUSSIAN RESEARCH: ELECTROPHYSICAL PROPERTIES OF CERTAIN AROMATIC KETAINES.
AD-609 789 DIV. 25
ELECTRONICALLY FUNCTIONAL ORGANIC MATERIALS.
AD-609 831 DIV. 25

PHASE STUDIES
METALLURGICAL ASPECTS OF GAAS-GE HETEROJUNCTIONS.
AD-609 611 DIV. 17

•SHEETS
DEFORMATION
TRANSLATION OF RUSSIAN RESEARCH: EQUILIBRIUM OF FLEXIBLE ELASTIC-PLASTIC SHELLS AND PLATES.
AD-609 786 DIV. 25

•SHELTERS
CHEMICAL WARFARE
COLLECTIVE PROTECTION
FOR COMBAT FIELD STRUCTURES.
AD-609 804 DIV. 3
COLLECTIVE PROTECTION
FOR COMBAT FIELD STRUCTURES, VOLUME I.
AD-609 805 DIV. 3
COLLECTIVE PROTECTION
FOR COMBAT FIELD STRUCTURES. VOLUME II.
AD-609 806 DIV. 3

CIVIL DEFENSE SYSTEMS
HISTORICAL INCIDENTS
OF EXTREME OVERCROWDING FOR POSSIBLE ANALOGY TO CIVIL DEFENSE SHELTERS.
AD-609 752 DIV. 32

MANAGEMENT ENGINEERING
OCCUPANCY EXERCISE RESEARCH
GUIDE: AN INTRODUCTION
TO THE RESEARCH USE OF THE SHELTER EXERCISE FOR TRAINING.
AD-609 480 DIV. 18

RADIOACTIVE FALLOUT
DESIGN AND PERFORMANCE
OF A FALLOUT-TESTED MANNED SHELTER STATION AND ITS SUITABILITY AS A SINGLE-FAMILY SHELTER.
AD-609 734 DIV. 18

•SHIELDING
MANNED SPACECRAFT
VULNERABILITY OF MANNED
ORBITAL COMMAND POSTS TO NATURAL SPACE RADIATIONS.
AD-609 501 DIV. 12

NUCLEAR EXPLOSIONS
ANALYSIS OF SHOAL DATA
ON GROUND MOTION AND CONTAINMENT
SAFETY PROGRAM.
AD-609 874 DIV. 20

•SHIP HULLS
VIBRATION
PREPARATION DATA FOR
COMPUTATION OF VERTICAL FLEXURAL
MODES OF HULL VIBRATION BY
DIGITAL PROCESS.
AD-609 620 DIV. 31
THE STEADY-STATE RESPONSE
OF A SHIP HULL TO A SIMPLE
HARMONIC DRIVING FORCE COMPUTED
BY A DIGITAL PROCESS.
AD-609 621 DIV. 31

•SHIP MODELS
HYDRODYNAMICS
EXPERIMENTAL DETERMINATION
OF WAVE-EXCITED FORCES AND
MOMENTS ACTING ON A SHIP MODEL
RUNNING IN OBLIQUE REGULAR
WAVES.
AD-609 856 DIV. 9

•SHIPS
WAKE
WAKE ANALYSIS OF SHIP
MODELS TWIN-SCREW MILITARY
TYPES.
AD-609 595 DIV. 9

•SHOCK TUBES
REACTION KINETICS
SHOCK TUBE WITH QUADROPOLE
MASS FILTER FOR MONITORING
HIGH-TEMPERATURE REACTION
KINETICS.
AD-609 775 DIV. 20

•SHOCK WAVES
FLUID DYNAMIC PROPERTIES
RESPONSE OF A THIN SHELL
TO A SHOCK WAVE; DETONATION
WAVES WITHIN A SPHERICAL SHELL.
AD-609 869 DIV. 22

•SILANES
VAPOR PLATING
COMPATIBLE ACTIVE THIN-
FILM INTEGRATED STRUCTURES.
AD-609 961 DIV. 8

•SILICON COMPOUNDS
OXIDES
SLIP-CAST FUSED SILICA.
AD-609 667 DIV. 12

•SILICON
TRANSISTORS
PRODUCTION ENGINEERING
MEASURE, TRANSISTOR, VHF, SILICON, POWER (5W-70MC).
AD-609 741 DIV. 8

•SILOXANES
CHEMICAL REACTIONS
TRANSLATION OF RUSSIAN
RESEARCH: REACTIONS OF
8OXYQUINOLINE TRIBUTOXY TITANIUM
WITH ALPHA, OMEGADIHYDROXY-
POLYDIMETGHYL-SILOXANE.
AD-609 787 DIV. 4

•SILVER
ELECTRODES
LOW TEMPERATURE CYCLING
BEHAVIOR OF THE SILVER ELECTRODE.
AD-609 876 DIV. 7

•SINGLE CRYSTALS
CRYSTAL GROWTH
PRODUCTION ENGINEERING
MEASURE: SPHERES OF YTTRIUM, IRON AND GARNET FOR FABRICATING
POWER LIMITERS.
AD-609 661 DIV. 8

IRON
FIELD ION MICROSCOPY
OF IRON WHISKERS.
AD-609 859 DIV. 17

•SKIN
SENSITIVITY
BIOSENSING TECHNICS FOR
HUMAN DETECTION: THE FROG
SKIN TRANSDUCER.
AD-609 936 DIV. 6

THERMAL RADIATION
INTRAVENOUS LETHALITY
F HUMAN SKIN HOMOGENATES IN
MICE.
AD-609 860 DIV. 16

•SLAGS
IRON
DIFFUSIVITY OF IRON IN
LIQUID SLAGS.
AD-609 959 DIV. 17

•SLEEP
PSYCHOLOGY
PSYCHOLOGICAL CORRELATES
OF PLATEAU SYPNOTIZABILITY
IN A SPECIAL VOLUNTEER SAMPLE.
AD-609 713 DIV. 28

•SMOKELESS PROPELLANTS
SYNTHESIS (CHEMISTRY)
RESEARCH IN NITROMONOMERS
AND THEIR APPLICATION TO SOLID
SMOKELESS PROPELLANTS.
AD-609 852 DIV. 10

•SMOKES
CONTAINERS
DEVELOPMENT AND EVALUATION
OF POLYSTYRENE FOAM CONTAINER
FOR MK 66 TYPE SUBMARINE
SIGNALS.
AD-609 647 DIV. 26

•SOCIAL SCIENCES
BRAZIL
U. S. ARMY AREA HANDBOOK
FOR BRAZIL.
AD-609 983 DIV. 18

•SOIL MECHANICS
MODEL THEORY
STRESS PROPAGATION IN
SOILS.
AD-609 559 DIV. 2

RADIOACTIVE FALLOUT
MIGRATION OF FUSED FALLOUT
SIMULANT INTO SOILS.
AD-609 649 DIV. 20

•SOILS
STRESSES
STRESS PROPAGATION IN
SOILS.
AD-609 559 DIV. 2

•SOLAR DISTURBANCES
TERRESTRIAL MAGNETISM
A COLLATION STUDY OF
A HIGHLY MAGNETIC PERIOD (SE
PTEMBER 20-23, 1963).
AD-609 862 DIV. 2

•SOLAR RADIATION
ALBEDO (ASTRONOMY)
ANALYSIS OF DAYTIME RADIATION
DATA FROM TIROS IV.
AD-609 767 DIV. 2

ARCTIC REGIONS
RADIATIVE ENERGY EXCHANGE
OVER ARCTIC LAND AND SEA.
AD-609 983 DIV. 2

•SOLENOIDS
PLASMA PHYSICS
A. C. SOLENOID OF FINITE
LENGTH IN A CONDUCTING MEDIUM
WITH HALL CONDUCTIVITY.
AD-609 963 DIV. 25

•SOLID ROCKET FUELS
COMBUSTION
GENERAL METHOD FOR CALCULATING
EQUILIBRIUM CONCENTRATIONS
OF COMBUSTION PRODUCTS OF
HIGH ENERGY FUELS.
AD-609 592 DIV. 10

•SOLID ROCKET PROPELLANTS
ACOUSTIC PROPERTIES
ACOUSTIC WAVE-BURNING
ZONE INTERACTION IN SOLID
PROPELLANTS.
AD-609 817 DIV. 10
ACOUSTIC WAVE-BURNING
ZONE INTERACTION IN SOLID
PROPELLANTS.
AD-609 818 DIV. 10
ACOUSTIC ADMITTANCE OF
BURNING SOLID PROPELLANT SURFACE.
AD-609 885 DIV. 10
ORIGIN AND PROPAGATION
OF DISTURBANCE IN THE BURNING
OF SOLID PROPELLANTS.
AD-609 886 DIV. 10
ORIGIN AND PROPAGATION
OF DISTURBANCE IN THE BURNING
OF SOLID PROPELLANTS.
AD-609 887 DIV. 10
ALUMINUM
ROLE OF ALUMINUM AND
ITS OXIDES IN SOLID PROPELLANT
EXHAUST.
AD-609 591 DIV. 10

SYNTHESIS (CHEMISTRY)
RESEARCH IN NITROMONOMERS
AND THEIR APPLICATION TO SOLID
SMOKELESS PROPELLANTS.
AD-609 852 DIV. 10

•SOLID STATE PHYSICS
RADIO NAVIGATION
CIRCUITRY FOR INTEGRATING
COMPONENTS INTO SOLID-STATE
TACAN TRANSPONDER BEACON
AND MONITOR.
AD-609 810 DIV. 19
REVIEWS
SOLID STATE RESEARCH.
AD-609 828 DIV. 25

•SOLIDS
ELASTICITY
TRANSIENT REPSONSE OF
A RIGID SPHERICAL INCLUSION
IN AN ELASTIC MEDIUM.
AD-609 890 DIV. 25

•SONAR SIGNALS
INTERFERENCE
OPTIMUM SIGNAL DESIGN
AND PROCESSING FOR REVERBERATION, LIMITED ENVIRONMENTS.
AD-609 589 DIV. 6

•SOUNDING ROCKETS
ATMOSPHERIC SOUNDING
ROCKET MEASUREMENTS WITH
ELECTRON AND ION PROBES IN
AN AURORA.
AD-609 954 DIV. 2

•SOUND
CYLINDRICAL BODIES
APPROXIMATION TO RELATION
BETWEEN CROSS SPECTRAL DENSITY
OF THE MEAN-SQUARE, FAR-FIELD
PRESSURE SURROUNDING A SOUND
SOURCE.
AD-609 634 DIV. 25
RANDOM LOADING AND RADIATION
FROM STIFFENED AND SANDWICH
TYPE CYLINDRICAL SHELL STRUCTURES. PART II, UNSYMMETRICAL
LOADING WITH KNOWN SPACE DISTR
IBUTION.
AD-609 636 DIV. 25

•SPACE BIOLOGY
LIFE SUPPORT
ABSTRACTS OF SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS: BIOSCIENCES.
AD-609 827 DIV. 16

•SPACE COMMUNICATION SYSTEMS
SIMULATION
ORBITAL FLIGHT AND COVERAGE SIMULATION.
AD-609 502 DIV. 12

TESTS
PROGRESS REPORT ON HAYSTACK HILL ANTENNAS, LES, AND PRESS PROJECT.
AD-609 872 DIV. 9

•SPACE ENVIRONMENTAL CONDITIONS
MILITARY SATELLITES
VULNERABILITY OF MANNED ORBITAL COMMAND POSTS TO NATURAL SPACE RADIATIONS.
AD-609 901 DIV. 12

SIMULATION
MODELING CRITERIA AND TESTING TECHNIQUES FOR THE SIMULATION OF SPACE ENVIRONMENTS.
AD-609 898 DIV. 12

•SPACE FLIGHT
TRACKING
ORBITAL FLIGHT AND COVERAGE SIMULATION.
AD-609 502 DIV. 12

•SPACE MEDICINE
INSTRUMENTATION
TECHNIQUES OF PHYSIOLOGICAL MONITORING: SYSTEMS.
AD-609 481 DIV. 16

•SPACE PROPULSION
ELECTRIC PROPULSION
SPACE PROPULSION BY PLASMA ACCELERATION TECHNIQUES.
AD-609 833 DIV. 27

•SPACE SURVEILLANCE SYSTEMS
THEORY
FIRST ORDER OBLATENESS PERTURBATIONS AND THE U. S. NAVAL SPACE SURVEILLANCE SYSTEM.
AD-609 566 DIV. 6

•SPACECRAFT
ATTITUDE INDICATORS
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME I. SYSTEM DESCRIPTION AND ANALYSIS.
AD-609 750 DIV. 12
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME II. DETAILED ANALYSIS OF ANTENNAS, PROPAGATION, POLARIZATION, AND PERFORMANCE.
AD-609 751 DIV. 12

RENDEZVOUS SPACECRAFT
DESIGN AND OPERATION OF A SPACE RENDEZVOUS SIMULATOR.
AD-609 748 DIV. 12

STRESSES
MODELING CRITERIA AND TESTING TECHNIQUES FOR THE SIMULATION OF SPACE ENVIRONMENTS.
AD-609 898 DIV. 12

•SPECIFIC HEAT
TABLES
TABLE ON THE DEBYE FUNCTIONS.
AD-609 702 DIV. 25

•SPECTRA (VISIBLE AND ULTRAVIOLET)
MOON
TRANSLATION OF RUSSIAN RESEARCH: PETROGRAPHIC INVESTIGATION OF THE LUNAR SURFACE BY JOINT USE OF PHOTOMETRIC AND COLORIMETRIC OBSERVATIONS.
AD-609 693 DIV. 2

•SPECTROSCOPY
ROCKET MOTORS (LIQUID PROPELLANT)
MONITORING OF ROCKET ENGINE PERFORMANCE BY SPECTROSCOPIC TECHNIQUES.
AD-609 492 DIV. 27

SOLID STATE PHYSICS
SOLID STATE RESEARCH.
AD-609 828 DIV. 25

•SPEECH RECOGNITION
COMPUTERS
TRANSLATION OF RUSSIAN ARTICLE ON SPEECH, ITS RECOGNITION AND BRAIN TRANSMISSION AND ATTENDANT PROCESSES.
AD-609 784 DIV. 30

•SPEECH
PERCEPTION
A SIMPLE LINEAR MODEL FOR VOWEL PERCEPTION.
AD-609 453 DIV. 16

WAVE TRANSMISSION
PERSONNEL COMMUNICATIONS IN SPACE-A STUDY OF SPEECH TRANSMISSION AND HELMET COMFORT.
AD-609 604 DIV. 29

•SPHERES
SINGLE CRYSTALS
PRODUCTION ENGINEERING MEASURE: SPHERES OF YTTRIUM, IRON AND GARNET FOR FABRICATING POWER LIMITERS.
AD-609 661 DIV. 8

•STAGNATION POINT
PITOT TUBES
UNCOOLED, RAPID RESPONSE PROBE FOR MEASURING STAGNATION PRESSURES IN HIGH VELOCITY ARC PLASMA.
AD-609 621 DIV. 25

•STAINLESS STEEL
CRYOGENICS
CRYOGENIC MATERIALS DATA HANDBOOK.
AD-609 562 DIV. 25

FRACTURE (MECHANICS)
CRACK INITIATION IN METALLIC MATERIALS.
AD-609 739 DIV. 17

•STATISTICAL ANALYSIS
GENETICS
NOTE ON REPEATED SELECTION IN THE NORMAL CASE.
AD-609 469 DIV. 32
ON THE PROBABILITY DISTRIBUTION OF X MODULO N.
AD-609 469 DIV. 32

REAL TIME
REAL TIME COMPUTATION OF CONFIDENCE ELLIPSOIDS.
AD-609 601 DIV. 19

•STATISTICAL DISTRIBUTIONS
TABLES
TABLES FOR THE STUDENTIZED LARGEST CHI-SQUARE DISTRIBUTION AND THEIR APPLICATIONS.
AD-609 588 DIV. 19

•STATISTICAL PROCESSES
STATISTICAL TESTS
SIMULTANEOUS TESTS FOR TREND AND SERIAL CORRELATIONS FOR GAUSSIAN MARKOV RESIDUALS.
AD-609 654 DIV. 19

•STATISTICAL TESTS
STATISTICAL FUNCTIONS
SIMULTANEOUS TESTS FOR TREND AND SERIAL CORRELATIONS FOR GAUSSIAN MARKOV RESIDUALS.
AD-609 654 DIV. 19

•STEAM CLEANING
WATER SOFTENERS
INFLUENCE OF PRESSURE ON SLUDGING OF P-C-437 STEAM CLEANERS.
AD-609 662 DIV. 29

•STEEL
CASTINGS
EFFECT OF SOLIDIFICATION IMPERFECTIONS ON THE TENSILE PROPERTIES OF CAST STEEL.
AD-609 491 DIV. 17

RADIATION DAMAGE
REPORT OF NRL PROGRESS.
AD-609 539 DIV. 30

YANKEE REACTOR PRESSURE VESSEL SURVEILLANCE: EVALUATION OF SPECIMENS EXPOSED DURING THE SECOND CORE.
AD-609 565 DIV. 20

TENSILE PROPERTIES
THE EFFECT OF SPECIMEN GEOMETRY ON DETERMINATION OF ELONGATION IN SHEET TENSILE SPECIMENS.
AD-609 689 DIV. 17

•STIFFENED CYLINDERS
SANDWICH CONSTRUCTION
EFFECT OF EXTERNAL OR INTERNAL STATIC PRESSURE ON THE NATURAL FREQUENCIES OF UNSTIFFENED,CROSS STIFFENED, AND SANDWICH CYLINDRICAL SHELLS.
AD-609 635 DIV. 25

•STOCHASTIC PROCESSES
DIFFERENTIAL EQUATIONS
ON THE RELATION BETWEEN ORDINARY AND STOCHASTIC DIFFERENTIAL EQUATIONS.
AD-609 826 DIV. 15

•STORAGE TUBES
COLOR
RESEARCH AND DEVELOPMENT OF TWO-COLOR DIRECT VIEW STORAGE TUBE WITH SELECTIVE ERASURE.
AD-609 491 DIV. 8

RESOLUTION
RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES. PHASE II.
AD-609 744 DIV. 8

•STRATEGIC AIR COMMAND
DATA TRANSMISSION SYSTEMS
DATA DISPLAY CENTRAL GROUP DISPLAY CHAIN AND ELECTRONIC DATA TRANSMISSION COMMUNICATIONS CENTRAL.
AD-609 773 DIV. 5

•STRESSES
MATHEMATICAL ANALYSIS
STRESS ANALYSIS OF A CYLINDER PRESSURE-LOADED OVER EQUAL AND OPPOSITE ARCS.
AD-609 640 DIV. 25
THE STRESSES IN A CYLINDRICAL SHELL CONTAINING AN AXIAL CRACK.
AD-609 669 DIV. 25

PROPAGATION
STRESS PROPAGATION IN SOILS.
AD-609 595 DIV. 2

•STRUCTURAL SHELLS
BUCKLING (MECHANICS)
BUCKLING CHARACTERISTICS OF THIN CYLINDRICAL SHELLS SUBJECTED TO AXIAL COMPRESSION AND INTERNAL PRESSURE.
AD-609 688 DIV. 25

DEFORMATION
TRANSLATION OF CZECHOSLOVAKIAN RESEARCH: NON SYMMETRICAL BUCKLING OF A FLAT ROUNDED SHELL WITH INITIAL DEFORMATION FROM EXTERNAL PRESSURE.
AD-609 780 DIV. 25
TRANSLATION OF RUSSIAN RESEARCH: EQUILIBRIUM OF FLEXIBLE ELASTIC-PLASTIC SHELLS AND PLATES.
AD-609 786 DIV. 25

EXPLOSIVE EFFECTS
RESPONSE OF A THIN SHELL TO A SHOCK WAVE; DETONATION WAVES WITHIN A SPHERICAL SHELL.
AD-609 865 DIV. 22

SANDWICH CONSTRUCTION
EFFECT OF EXTERNAL OR INTERNAL STATIC PRESSURE ON THE NATURAL FREQUENCIES OF UNSTIFFENED,CROSS STIFFENED AND SANDWICH CYLINDRICAL SHELLS.
AD-609 635 DIV. 25

STRESSES
THE STRESSES IN A CYLINDRICAL SHELL CONTAINING AN AXIAL CRACK.
AD-609 669 DIV. 25

•STRUCTURAL PROPERTIES
STUDIES ON THE INSTABILITY OF CIRCULAR RINGS.
AD-609 503 DIV. 13

•STRUCTURES
VIBRATION
APPROXIMATION TO RELATION BETWEEN CROSS SPECTRAL DENSITY OF THE MEAN-SQUARE, FAR-FIELD PRESSURE SURROUNDING A SOUND SOURCE.
AD-609 634 DIV. 28

•STUDENTS
PSYCHOMETRICS
IDENTIFYING RESEARCH CHARACTERISTICS IN HIGH SCHOOL STUDENTS: SEARCH METHODS FOR SCIENTIFIC TALENT FOR MILITARY PERSONNEL RECRUITMENT.
AD-609 485 DIV. 23

•STYRENE PLASTICS
COPOLYMERIZATION
STUDIES IN IONIC COPOLYME RIZATION.
AD-609 497 DIV. 4

EXPANDED PLASTICS
DEVELOPMENT AND EVALUATION OF POLYSTYRENE FOAM CONTAINER FOR MK 66 TYPE SUBMARINE SIGNALS.
AD-609 647 DIV. 24

•SUBJECT INDEXING
CLASSIFICATION
MULTI-LIST SYSTEM: ADDITIONAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 709 DIV. 32
MULTI-LIST SYSTEM: FINAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 710 DIV. 32

•SUBLIMATION
AMMONIUM COMPOUNDS
RATE OF SUBLIMATION OF AMMONIUM HALIDES.
AD-609 814 DIV. 4

•SUBMARINE HULLS
FILAMENT WOUND CONSTRUCTION
RESIDUAL STRESSES IN THICK GLASS FILAMENT REINFORCED LAMINATES.
AD-609 610 DIV. 14
OPTIMUM FILAMENT DIAMETERS FOR STRUCTURAL COMPOSITE FOR DEEP SUBMERSIBLES.
AD-609 698 DIV. 31

•SUBMARINES
CARBON DIOXIDE
STABILIZATION OF MONOETHA NOLAMINE SOLUTIONS FOR SUBMARINE CARBON DIOXIDE SCRUBBERS.
AD-609 888 DIV. 31

•SUDAN
HANDBOOKS
U. S. ARMY AREA HANDBOOK FOR THE REPUBLIC OF THE SUDAN.
AD-609 590 DIV. 32

•SUPERSONIC FLOW
NUMERICAL ANALYSIS
SOLUTION OF THE INVISCID FLOW DUE TO DISPLACEMENT BY THE METHOD OF INTEGRAL RELATIONS.
AD-609 869 DIV. 9

•SURFACES PROPERTIES
GLASS TEXTILES
GLASS/RESIN INTERFACE: PATENT SURVEY, PATENT LIST, AND GENERAL BIBLIOGRAPHY.
AD-609 926 DIV. 14

•SURFACE-ACTIVE SUBSTANCES
THERMODYNAMICS
ENERGETICS OF MICELLAR SOLUBILIZATION, AN ACTION OF THE DETERGENCY MECHANISM.
AD-609 665 DIV. 14

•SURVEYING
OPTICAL EQUIPMENT
TRANSLATION OF RUSSIAN PATENT: METHOD OF MEASURING DISTANCE BASED ON THE USE OF A LIGHT RANGE METER WITH AN ACTIVE REFLECTOR.
AD-609 789 DIV. 2

•SWITCHING CIRCUITS
SYNTHESIS
REALIZATION OF BINARY SWITCHING FUNCTIONS WITH MAJORITY GATES.
AD-609 504 DIV. 7
ALGEBRAIC-GEOMETRIC TECHNIQUE FOR THE REALIZATION OF SWITCHING FUNCTIONS WITH M-OUT-OF-N DECISION GATES.
AD-609 505 DIV. 7

THEORY
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 708 DIV. 8
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 745 DIV. 8

•SYSTEM TEST VESSELS
UNDERWATER ORDNANCE
YFU-99 DEEP DEPTH TEST FACILITY. UNDERWATER ORDNANCE TEST FACILITY.
AD-609 823 DIV. 30
LAND CRAFT UTILITY 1496 MOBILE TEST FACILITY.
AD-609 878 DIV. 22

•SYSTEMS ENGINEERING
AIR FORCE
SYSTEM INSTALLATION AND TESTING.
AD-609 977 DIV. 18

MATHEMATICAL MODELS
CONCEPTS RELATIVE TO SYSTEM EFFECTIVENESS.
AD-609 637 DIV. 30

•TABLES
INTEGRALS
TABLE ON THE DEBYE FUNCTIONS.
AD-609 702 DIV. 25

STATISTICAL DISTRIBUTIONS
TABLES FOR THE STUDENTIZED LARGEST CHI-SQUARE DISTRIBUTION AND THEIR APPLICATIONS.
AD-609 988 DIV. 15

•TANTALUM CAPACITORS
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE FOR IMPROVED RELIABILITY OF SOLID ELECTROLYTE TANTALUM CAPACITORS.
AD-609 707 DIV. 8

•TARGET DISCRIMINATION
INTERFERENCE
OPTIMUM SIGNAL DESIGN AND PROCESSING FOR REVERBERATION, LIMITED ENVIRONMENTS.
AD-609 989 DIV. 6

•TEACHING MACHINES
PROGRAMMING (COMPUTERS)
A DESCRIPTIVE LIST OF PLATO LESSON PROGRAMS, 1960-1964.
AD-609 699 DIV. 23

PSYCHOMETRICS
EVALUATION OF TRAINING DEVICES EMPLOYING MULTIPLE TRACKS IN A LINEAR PROGRAM.
AD-609 801 DIV. 23
LEARNING SET FORMATION IN PROGRAMMED INSTRUCTION.
AD-609 802 DIV. 23

•TEMPERATURE CONTROL
SATELLITES (ARTIFICIAL)
THERMAL DESIGN TESTS OF THE IGY SATELLITE. (PAYLOAD FOR MISSILE NO. 16).
AD-609 991 DIV. 12

•TERRAIN
EROSION
EROSION OF THE CLIFFS OF OUTER CAPE COD: TABLES AND GRAPHS.
AD-609 839 DIV. 2

•TERRESTRIAL MAGNETISM
SOLAR DISTURBANCES
A COLLATION STUDY OF A HIGHLY MAGNETIC PERIOD (SE PTEMBER 20-23, 1963).
AD-609 862 DIV. 2

•TEST CONSTRUCTION (PSYCHOLOGY)
PSYCHOMETRICS
PSYCHOLOGICAL MEASUREMENT AND PREDICTION. PART III, THE STRUCTURE OF TESTS.
AD-609 916 DIV. 28

•TEST EQUIPMENT (ELECTRONICS)
TRANSISTORS
ELECTRONIC PARTS-ACCELERATED LIFE TESTS.
AD-609 808 DIV. 8

•TEST EQUIPMENT
RADIOFREQUENCY FILTERS
BRIDGED 'T' REJECTION FILTERS.
AD-609 979 DIV. 8

•TEST FACILITIES
UNDERWATER ORDNANCE
MORRIS DAM BALLISTIC RANGE. UNDERWATER ORDNANCE TEST FACILITY.
AD-609 822 DIV. 30
LONG BEACH SEA RANGE. UNDERWATER ORDNANCE TEST FACILITY.
AD-609 824 DIV. 30
LAND CRAFT UTILITY 1496 MOBILE TEST FACILITY.
AD-609 878 DIV. 22

•TEST METHODS
STAGNATION POINT
UNCOOLED, RAPID RESPONSE PROBE FOR MEASURING STAGNATION PRESSURES IN HIGH VELOCITY ARC PLASMA.
AD-609 621 DIV. 25

TENSILE PROPERTIES
THE EFFECT OF SPECIMEN GEOMETRY ON DETERMINATION OF ELONGATION IN SHEET TENSILE SPECIMENS.
AD-609 689 DIV. 17

•THERMAL CONDUCTIVITY
HONEYCOMB CORES
METHOD FOR PREDICTING THERMAL RESPONSE IN SANDWICH PANELS.
AD-609 506 DIV. 13

NUMERICAL ANALYSIS
STABILITY CRITERIA OF EXPLICIT DIFFERENCE SCHEMES FOR CERTAIN HEAT CONDUCTION PROBLEMS WITH UNCOMMON BOUNDARY CONDITIONS.
AD-609 738 DIV. 25

•THERMAL RADIATION
CESIUM
THERMAL EMISSION OF NEUTRAL CESIUM.
AD-609 984 DIV. 25

•THERMAL STRESSES
ROCKET PROPELLANT GRAINS
THERMAL GRAIN STRUCTURAL ANALYSIS.
AD-609 747 DIV. 10

•THERMODYNAMICS
TABLES
THERMODYNAMIC PROPERTIES OF CARBON-NITROGEN MIXTURES AT HIGH TEMPERATURES.
AD-609 670 DIV. 25

•THERMOELECTRICITY
BORIDES
THERMOELECTRIC POWER OF THE TRANSITION METAL DIBORIDES.
AD-609 816 DIV. 25

•THIN FILMS (STORAGE DEVICES)
NICKEL ALLOYS
MAGNETIC PROPERTIES OF ELECTRODEPOSITED NICKEL-IRON-COBALT FILMS.
AD-609 829 DIV. 17

•THRUST BEARINGS
TURBOPUMPS
HYDROSTATIC BEARING FEASI BILITY PROGRAM.
AD-609 628 DIV. 27

•THUNDERSTORMS
DAMAGE
EFFECTS OF THUNDERSTORMS ON SEISMOLOGICAL OPERATIONS, 1964.
AD-609 937 DIV. 2

•TIDES
FLORIDA
OBSERVATIONS OF TIDAL PERIODIC INTERNAL WAVES OVER A THREE DAY PERIOD OFF PANAMA CITY, FLORIDA.
AD-609 796 DIV. 2

•TIME-INTERVAL COUNTERS
TESTS
DETECTION OF RATE CHANGES IN PERIODIC PHENOMENA.
AD-609 698 DIV. 28

•TIME-LAG THEORY
PROBABILITY
DETECTION OF RATE CHANGES IN PERIODIC PHENOMENA.
AD-609 698 DIV. 28

•TISSUE EXTRACTS
TOXICITY
INTRAVENOUS LETHALITY F HUMAN SKIN HOMOGENATES IN MICE.
AD-609 860 DIV. 16

•TITANIUM ALLOYS
CRYOGENICS
CRYOGENIC MATERIALS DATA HANDBOOK.
AD-609 562 DIV. 25

DIFFUSION
DIFFUSION IN COLUMBIUM RICH COLUMBIUM-TITANIUM ALLOYS WITH CONSIDERATION OF THE POSSIBILITY THAT THE DIFFUSION COEFFICIENT IS TIME DEPENDENT.
AD-609 870 DIV. 17

FRACTURE (MECHANICS)
CRACK INITIATION IN METALLIC MATERIALS.
AD-609 739 DIV. 17

MILITARY REQUIREMENTS
U. S. ARMY REQUIREMENTS FOR TITANIUM ALLOYS WITH RESPECT TO VEHICULAR APPLICATIONS.
ALPHA-BETA TITANIUM ALLOY.
AD-609 673 DIV. 17

•TITANIUM COMPOUNDS
CHEMICAL REACTIONS
TRANSLATION OF RUSSIAN RESEARCH:. REACTIONS OF ROXYQUINOLINE TRIBUTOXY TITANIUM WITH ALPHA, OMEGADIHYDROXY-POLYDIMETGHYL-SILOXANE.
AD-609 787 DIV. 4

•TOPOLOGY
ALGEBRA
AN IMBEDDING OF CLOSED RIEMANN SURFACES IN EUCLIDEAN SPACE.
AD-609 866 DIV. 15

•TRACKING
PERFORMANCE (HUMAN)
TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY AND LEARNING.
AD-609 811 DIV. 28

•TRAFFIC
MATHEMATICAL MODELS
MULTIPLE EQUATION MODEL OF HOUSEHOLD LOCATIONAL AND TRIPMAKING BEHAVIOR.
AD-609 758 DIV. 33

•TRAINING DEVICES
DEPARTMENT OF DEFENSE
SUPPLEMENT TO 'MANAGEMENT OF VALUE ENGINEERING PROGRAMS IN DEFENSE CONTRACTS'; TRAINING AIDS: DESCRIPTION AND FORMAT.
AD-609 884 DIV. 18

EFFECTIVENESS
STUDY OF TRAINING PERFORMANCE EVALUATION TECHNIQUES.
AD-609 605 DIV. 23

TEACHING MACHINES
EVALUATION OF TRAINING DEVICES EMPLOYING MULTIPLE TRACKS IN A LINEAR PROGRAM.
AD-609 801 DIV. 23
LEARNING SET FORMATION IN PROGRAMMED INSTRUCTION.
AD-609 802 DIV. 23

•TRAINING
PERFORMANCE TESTS
STUDY OF TRAINING PERFORMANCE EVALUATION TECHNIQUES.
AD-609 605 DIV. 23

SCIENTIFIC RESEARCH
OCCUPANCY EXERCISE RESEARCH GUIDE: AN INTRODUCTION TO THE RESEARCH USE OF THE SHELTER EXERCISE FOR TRAINING.
AD-609 480 DIV. 18

•TRAJECTORIES
SPACECRAFT
OPTIMIZATION OF RECOVERY TRAJECTORIES FOR SPACE VEHICLES.
AD-609 573 DIV. 12

•TRANSDUCERS
FIELD THEORY
TOROIDAL WAVE FUNCTIONS AND THEIR APPLICATION TO THE FREEFLOODING RING TRANSDUCER.
AD-609 529 DIV. 25

SKIN
BIOSENSING TECHNICS FOR HUMAN DETECTION: THE FROG SKIN TRANSDUCER.
AD-609 436 DIV. 6

•TRANSISTOR AMPLIFIERS
L BAND
LOW-NOISE L-BAND AMPLIFIER.
AD-609 494 DIV. 8

PRODUCTION
PRODUCTION ENGINEERING MEASURE, TRANSISTOR, VHF, SILICON, POWER (5W-70MC).
AD-609 741 DIV. 8

•TRANSISTORS
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES 2N599-2N1094.
AD-609 442 DIV. 8
PRODUCTION ENGINEERING MEASURE: IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE RELIABILITY OF SILICON PLANAR EPITAXIAL: TRANSISTOR (WX-4001), LOGIC GATE (WM-201), FLIP-FLOP (WM-202), AC BINARY (WM-213).
AD-609 448 DIV. 8
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND TO INSURE THE RELIABILITY OF THE C600 SERIES FIELD EFFECT TRANSISTORS.
AD-609 596 DIV. 8

PRODUCTION
PRODUCTION ENGINEERING MEASURE: MECHANIZATION OF SEMICONDUCTOR DEVICES.
AD-609 522 DIV. 8

RADIOFREQUENCY OSCILLATORS
UHF POWER TRANSISTOR.
AD-609 626 DIV. 8

RELIABILITY (ELECTRONICS)
ELECTRONIC PARTS-ACCELERATED LIFE TESTS.
AD-609 808 DIV. 8

VERY HIGH FREQUENCY
PRODUCTION ENGINEERING MEASURE, TRANSISTOR, VHF, SILICON, POWER (5W-70MC).
AD-609 741 DIV. 8

•TRANSMIT-RECEIVE TUBES
RADAR DUPLEXERS
RUGGEDIZED MICROWAVE DUPLEXING TUBES: PRODUCTION ENGINEERING MEASURES PROGRAM.
AD-609 761 DIV. 8

•TRANSPORT PROPERTIES
NUMERICAL ANALYSIS
CHOICE OF AN APPROPRIATE MEAN ABSORPTION COEFFICIENT FOR USE IN THE GENERAL GREY GAS EQUATIONS.
AD-609 838 DIV. 25

•TRANSPORTATION
MATHEMATICAL MODELS
FIRST APPROXIMATION TO A RAND MODEL FOR STUDY OF URBAN TRANSPORTATION.
AD-609 771 DIV. 33

URBAN AREAS
TRANSPORTATION FOR FUTURE URBAN COMMUNITIES: A STUDY PROSPECTUS.
AD-609 756 DIV. 33

URBAN PLANNING
ANALYSIS OF SOME LAND TRANSPORTATION VEHICLES -UTOMO BILE, BUS, AND RAILROAD CAR -TODAY AND TOMORROW.
AD-609 754 DIV. 11
MODELS OF URBAN CHANGE: THEIR ROLE IN URBAN TRANSPORTATION RESEARCH.
AD-609 755 DIV. 33
MULTIPLE EQUATION MODEL OF HOUSEHOLD LOCATIONAL AND TRIPMAKING BEHAVIOR.
AD-609 758 DIV. 33

•TRAVELING-WAVE TUBES
MICROWAVE AMPLIFIERS
LOW-NOISE, MULTIPLE-FUNCTION, X-BAND TRAVELING-WAVE TUBE.
AD-609 572 DIV. 8

PLASMA PHYSICS
RESEARCH ON ELECTROMAGNETIC PLASMA ACCELERATION.
AD-609 482 DIV. 25

•TROPOSPHERE
REFRACTIVE INDEX
PROCEEDINGS OF THE TROPOS PHERIC REFRACTION EFFECTS MEETING (NO. 3). VOLUME 1. RESULTS AND STATUS OF TROPOSPHERIC-EFFECTS MEASUREMENT PROGRAM.
AD-609 731 DIV. 8

•TUNGSTEN ALLOYS
SHEETS
REFRACTORY ALLOY SHEET MATERIALS.
AD-609 813 DIV. 17

•TUNNEL DIODES
CIRCUITS
INVESTIGATION OF SOLID STATE DEVICES AND CIRCUITS.
AD-609 674 DIV. 8

•TURBOPUMPS
BEARINGS
HYDROSTATIC BEARING FEASI BILITY PROGRAM.
AD-609 628 DIV. 27

•TURBULENCE
VORTICES
EXPERIMENTAL STUDY OF TURBULENCE IN A DRIVEN VORTEX.
AD-609 460 DIV. 9

•ULTRASONIC RADIATION
PIEZOELECTRIC TRANSDUCERS
SOME RECENT ADVANCES IN MICROWAVE PHONON GENERATION AND DETECTION WITH APPLICATIONS TO THE STUDY OF PHONON-LATTICE INTERACTIONS IN DIELECTRIC MATERIALS.
AD-609 479 DIV. 25

•ULTRAVIOLET OPTICAL MATERIALS
POLARIZATION
REPORT OF NRL PROGRESS.
AD-609 535 DIV. 30

•UNDERGROUND STRUCTURES
CORROSION
CORROSION INVESTIGATIONS, TRACY-RED, CALIFORNIA, EHV DIRECT-CURRENT TESTS.
AD-609 766 DIV. 17

•UNDERWATER COMMUNICATION SYSTEMS
ACOUSTICS
COMMUNICATION CHARACTERISTICS OF AN UNDERWATER ACOUSTIC SIGNAL REFLECTED FROM A SPACE AND TIME RANDOM SURFACE.
AD-609 627 DIV. 9

•UNDERWATER EQUIPMENT
DIPOLE ANTENNAS
DYNAMIC ELECTRICAL MODELING OF ELECTRODES MOVING IN SEA WATER.
AD-609 717 DIV. 8

•UNDERWATER ORDNANCE
SYSTEM TEST VESSELS
YFU-99 DEEP DEPTH TEST FACILITY. UNDERWATER ORDNANCE TEST FACILITY.
AD-609 823 DIV. 30
LAND CRAFT UTILITY 1996 MOBILE TEST FACILITY.
AD-609 878 DIV. 22

•URANIUM ALLOYS
STRUCTURAL PROPERTIES
STRUCTURAL URANIUM ALLOY.
AD-609 559 DIV. 17

•URBAN AREAS
TRANSPORTATION
MODELS OF URBAN CHANGE: THEIR ROLE IN URBAN TRANSPORTATION RESEARCH.
AD-609 755 DIV. 33
TRANSPORTATION FOR FUTURE URBAN COMMUNITIES: A STUDY PROSPECTUS.
AD-609 756 DIV. 33
FIRST APPROXIMATION TO A RAND MODEL FOR STUDY OF URBAN TRANSPORTATION.
AD-609 771 DIV. 33

•URBAN PLANNING
TRANSPORTATION
MULTIPLE EQUATION MODEL OF HOUSEHOLD LOCATIONAL AND TRIPMAKING BEHAVIOR.
AD-609 758 DIV. 33

•USSR
OFFICER PERSONNEL
TRANSLATION OF 'RED STAR' ARTICLE WITH DISCUSSION OF ARTICLE BY LT. COL. L. GONCHAROV ENTITLED 'THE COMMANDER AND TIME.'
AD-609 694 DIV. 18

•VANADIUM ALLOYS
CREEP
VANADIUM ALLOY STUDIES.
AD-609 727 DIV. 17

•VEHICLES
MANUFACTURING METHODS
POTENTIAL OF CASTINGS IN FUTURE ARMY VEHICLES.
AD-609 671 DIV. 26

•VERTICAL TAKE-OFF PLANES
FLIGHT CONTROL SYSTEMS
ADVANCED FLIGHT CONTROL SYSTEM CONCEPTS FOR VTOL AIRCRAFT.
AD-609 553 DIV. 1

•VESTIBULAR APPARATUS
HISTOLOGY
COMPARATIVE HISTOLOGICAL STUDY OF THE REINFORCED AREA OF THE SACCULAR MEMBRANE IN MAMMALS.
AD-609 443 DIV. 16

•VIABILITY
STRESS (PHYSIOLOGY)
TECHNIQUES OF PHYSIOLOGICAL MONITORING: SYSTEMS.
AD-609 481 DIV. 16

•VIBRATION
BEAMS (STRUCTURAL)
FORCED VIBRATION OF BEAMS AND FLUTTER OF BEAM-FOIL SYSTEMS.
AD-609 499 DIV. 9

NUMERICAL ANALYSIS
THE STEADY-STATE RESPONSE OF A SHIP HULL TO A SIMPLE HARMONIC DRIVING FORCE COMPUTED BY A DIGITAL PROCESS.
AD-609 631 DIV. 31

•VIDICONS
DESIGN
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
AD-609 843 DIV. 8

•VOLTAGE REGULATORS
POWER SUPPLIES
A FIXED-VOLTAGE POWER SUPPLY FOR TRANSISTOR CIRCUITS.
AD-609 447 DIV. 8

•VORTICES
TURBULENCE
EXPERIMENTAL STUDY OF TURBULENCE IN A DRIVEN VORTEX.
AD-609 460 DIV. 9

•WAKE
LAMINAR FLOW
THE NEAR WAKE OF A WEDGE.
AD-609 577 DIV. 9

SHIP MODELS
WAKE ANALYSIS OF SHIP MODELS TWIN-SCREW MILITARY TYPES.
AD-609 595 DIV. 9

•WATER SOFTENERS
STEAM CLEANING
INFLUENCE OF PRESSURE ON SLUDGING OF P-C-437 STEAM CLEANERS.
AD-609 662 DIV. 29

•WAVEGUIDES
ELECTROMAGNETIC WAVE REFLECTIONS
ON ANALYTIC CONTINUATION OF A CLOSED REGION SOLUTION TO AN OPEN REGION.
AD-609 857 DIV. 8

•WEAPON SYSTEMS
SYSTEMS ENGINEERING
ASSESSING THE IMPACT OF WEAPON SYSTEM MODIFICATIONS BY FIELD STUDY: A FEASIBILITY DEMONSTRATION.
AD-609 791 DIV. 18
PRODUCT IMPROVEMENT CANDIDATE SELECTION AND MANAGEMENT INFORMATION: WEAPON SYSTEM ANALYSIS.
AD-609 793 DIV. 18

•WEATHER FORECASTING
METEOROLOGICAL RADAR
STORM RADAR DATA PROCESSOR EVALUATION.
AD-609 820 DIV. 2

METEOROLOGICAL SATELLITES
PRACTICAL INTERPRETATION OF METEOROLOGICAL SATELLITE DATA.
AD-609 493 DIV. 2

•WEDGES
WIND TUNNEL MODELS
THE NEAR WAKE OF A WEDGE.
AD-609 577 DIV. 9

•WELDING
ALUMINUM ALLOYS
DIRECT-CURRENT MANUAL WELDING OF 2014-T6 ALUMINUM.
AD-609 516 DIV. 26
MANUAL 'FREE' WELDING OF 2014-T6 ALUMINUM.
AD-609 517 DIV. 26

•WELDS
ALUMINUM ALLOYS
EVALUATION OF 6061-T6 TO 2014-T6 AND 6061-T6 TO 6061-T6 ALUMINUM ALLOY WELDS.
AD-609 518 DIV. 26

•WEST GERMANY
ARMED FORCES (FOREIGN)
TRANSLATION OF PRESS ITEM REGARDING USE OF DATA PROCESSING BY TERMINOLOGY GROUP OF THE WESTERN GERMANY ARMED FORCES IN MANNHEIM.
AD-609 620 DIV. 30

•WIND
PERIODIC VARIATIONS
DIURNAL AND SEMIDIURNAL VARIATIONS OF ISOPYCNIC SURFACES UP TO THE MESOPAUSE AS INFERRED BY THE WIND FIELD.
AD-609 723 DIV. 2

•WOOD
PRESERVATION
PRESERVATIVE TREATMENT OF WOOD FOR COMBAT VEHICLES.
AD-609 663 DIV. 19

•X RAYS
SCATTERING
DETERMINATION OF X-RAY SCATTERING FACTORS WITH LIQUID SPECIMENS.
AD-609 603 DIV. 20

•ZIRCONIUM ALLOYS
RESISTANCE (ELECTRICAL)
ELECTRICAL RESISTIVITY OF NIOBIUM-ZIRCONIUM ALLOYS BELOW 273.2K.
AD-609 798 DIV. 17

PERSONAL AUTHOR INDEX

•ABBOTT, K. H.
• • •
THE POTENTIAL OF CASTINGS IN FUTURE ARMY VEHICLES.
AD-609 671 DIV. 26

•ABMA, JOHN S.
• • •
AN EVALUATION OF MULTIPLE TRACKS IN A LINEAR PROGRAM.
AD-609 801 DIV. 23
• • •
LEARNING SET FORMATION IN PROGRAMMED INSTRUCTION.
AD-609 802 DIV. 23

•ADAMS, EMILY J.
• • •
THE STEADY-STATE RESPONSE OF A SHIP HULL TO A SIMPLE HARMONIC DRIVING FORCE COMPUTED BY A DIGITAL PROCESS,
AD-609 631 DIV. 31

•ADAMS, T. W.
• • •
U. S. ARMY AREA HANDBOOK FOR CYPRUS,
AD-609 948 DIV. 32

•AGRICOLA, K. R.
• • •
MANUAL 'FREE' WELDING OF 2014-T6 ALUMINUM.
AD-609 917 DIV. 26

•AGRICOLA, R.
• • •
PRELIMINARY EVALUATION OF DIRECT-CURRENT MANUAL WELDING OF 2014-T6 ALUMINUM,
AD-609 914 DIV. 26
• • •
EVALUATION OF 6061-T6 TO 2014-T6 AND 6061-T6 TO 6061-T6 ALUMINUM ALLOY WELDS
AD-609 918 DIV. 26

•ALBERT, ARTHUR
• • •
REAL TIME COMPUTATION OF CONFIDENCE ELLIPSOIDS,
AD-609 601 DIV. 19

•ALEXANDER, A. L.
• • •
CORROSION OF METALS IN TROPICAL ENVIRONMENTS. PART 6. ALUMINUM AND MAGNESIUM.
AD-609 618 DIV. 17

•ALEXANDROV, N. A.
• • •
WHY THE USA IS STRAINING TO GET INTO OUTER SPACE,
AD-609 985 DIV. 18

•ALNUTT, RICHARD B.
• • •
TECHNIQUES OF PHYSIOLOGICAL MONITORING. VOLUME III. SYSTEMS.
AD-609 981 DIV. 16

•AMAREL, S.
• • •
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 709 DIV. 8

•ANAND, S. P. S.
• • •
BASIC EQUATIONS OF THE RELATIVISTIC TEST PARTICLE PROBLEM.
AD-609 990 DIV. 29

•ANDERSON, CALVIN E.
• • •
HEAT TRANSPORT BY LARGE-SCALE ATMOSPHERIC WAVES DURING OCTOBER 1959-MARCH 1960.
AD-609 803 DIV. 2

•ANDERSON, VICTOR C.
• • •
MANIPULATORS AND SPECIAL DEVICES,
AD-609 490 DIV. 2

•ANDREWS, J. E.
• • •
PRODUCTION ENGINEERING MEASURE. YIG SPHERES AND LIMITERS.
AD-609 661 DIV. 8

•ANDRIANOV, K. A.
• • •
ABOUT REACTIONS OF 8-OXYQUINOLINE TRIBUTOXY TITANIUM WITH D, W-DIHYDROXY-POLYDIMETHYL SILOXANE,
AD-609 787 DIV. 4

•ANGELL, DAVID
• • •
STUDY OF TRAINING PERFORMANCE EVALUATION TECHNIQUES.
AD-609 605 DIV. 23

•ANTAL, J. J.
• • •
VIBRATIONAL LEVELS IN LIQUID BROMINE BY NEUTRON INELASTIC SCATTERING,
AD-609 678 DIV. 20

•ANTHONY, MAURICE L.
• • •
AN ANALYTICAL STUDY OF THE EFFECTS OF OBLATENESS ON SATELLITE ORBITS,
AD-609 919 DIV. 12

•ANTONINI, M.
• • •
VIBRATIONAL LEVELS IN LIQUID BROMINE BY NEUTRON INELASTIC SCATTERING,
AD-609 678 DIV. 20

•ARMITAGE, JOHN V.
• • •
TABLES FOR THE STUDENTIZED LARGEST CHI-SQUARE DISTRIBUTION AND THEIR APPLICATIONS,
AD-609 588 DIV. 19

•ARMSTRONG, H.
• • •
PROPERTIES OF BUOYANT MATERIALS AND STRUCTURES.
AD-609 821 DIV. 14

•ARNOLD, S. V.
• • •
U. S. ARMY REQUIREMENTS FOR TITANIUM ALLOYS WITH RESPECT TO VEHICULAR APPLICATIONS. ALPHA-BETA TITANIUM ALLOY.
AD-609 673 DIV. 17

•ASMUS, J. F.
• • •
AN ANALYSIS OF PERTURBED CONFOCAL RESONATORS.
AD-609 769 DIV. 29

•AVERBACH, B. L.
• • •
DETERMINATION OF X-RAY SCATTERING FACTORS WITH LIQUID SPECIMENS.
AD-609 603 DIV. 20

•AVNER, R. A.
• • •
DETECTION OF RATE CHANGES IN PERIODIC PHENOMENA,
AD-609 698 DIV. 28

•AZAROFF, LEONID V.
• • •
DIFFUSION STUDIES IN CERAMIC CRYSTALS.
AD-609 724 DIV. 29

•BACCHUS, JOAN
• • •
HISTORICAL INCIDENTS OF EXTREME OVERCROWDING.
AD-609 752 DIV. 32

•BACKSTROM, T. E.
• • •
CORROSION INVESTIGATIONS, TRACY-RED BLUFF, CALIFORNIA, EHV DIRECT-CURRENT TESTS.
AD-609 766 DIV. 17

•BADE, W. L.
• • •
CALIBRATION OF A PLASMA JET FACILITY FOR SIMULATION OF BALLISTIC MISSILE RE-ENTRY
AD-609 993 DIV. 12

•BAILEY, DESMOND T.
• • •
RADIATIVE ENERGY EXCHANGE OVER ARCTIC LAND AND SEA, PART I, DATA, 1962.
AD-609 983 DIV. 2

•BAKER, K. D.
• • •
ROCKET MEASUREMENTS WITH ELECTRON AND ION PROBES IN AN AURORA.
AD-609 954 DIV. 2

•BALL, L.
• • •
DYNAMIC ELECTRICAL MODELING OF ELECTRODES MOVING IN SEA WATER.
AD-609 717 DIV. 8

•BALLESTER, MANUEL
• • •
A STUDY OF THE SYNTHESIS AND PROPERTIES OF ALKAROMATIC CHLOROCARBONS.
AD-609 969 DIV. 4

•BARBER, H. H., JR.
• • •
THE RADIATION CHEMISTRY OF ACETYLENIC COMPOUNDS.
AD-609 940 DIV. 4

•BARKAN, P.
• • •
AN UNCOOLED, RAPID RESPONSE PROBE FOR MEASURING STAGNATION PRESSURES IN HIGH VELOCITY ARC PLASMA.
AD-609 621 DIV. 25

•BARNETT, CLIFFORD R.
• • •
U. S. ARMY AREA HANDBOOK FOR ETHIOPIA.
AD-609 949 DIV. 32

•BARNHART, CLYDE S., SR.
• • •
BIOSENSING TECHNICS FOR HUMAN DETECTION. 1. THE FROG SKIN TRANSDUCER: PRELIMINARY EXPERIMENT.
AD-609 936 DIV. 6

•BARON, S.
• • •
DIFFERENTIAL GAMES AND OPTIMAL PURSUITEVASION STRATEGIES
AD-609 772 DIV. 15

•BAPR, ROBERT Q.
• • •
STUDIES OF REFRACTORY ALLOY SHEET MATERIALS.
AD-609 819 DIV. 17

•BARTON, M. V.
• • •
VIBRATION OF RECTANGULAR AND SKEW CANTILEVER PLATES REPRESENTING IDEALIZED MISSILE FINS,
AD-609 742 DIV. 12

•BASKEN, PAUL
• • •
RUGGEDIZED MICROWAVE DUPLEXING TUBES: PRODUCTION ENGINEERING MEASURES PROGRAM.
AD-609 761 DIV. 8

•BASU, SANTIMAY
• • •
VERY LOW FREQUENCY ENVELOPE SPECTRA OF SOLAR RADIO BURSTS.
AD-609 861 DIV. 2

•BATCHELOR, JAMES D.
• • •
CASTABLE CARBON FOR NOZZLE APPLICATIONS.
AD-609 607 DIV. 27

•BAUER, BENJAMIN B.
• • •
PERSONNEL COMMUNICATIONS IN SPACE. A STUDY OF SPEECH TRANSMISSION AND HELMET COMFORT.
AD-609 609 DIV. 29

•BAYLOR, J. T.
• • •
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME I. SYSTEM DESCRIPTION AND ANALYSIS.
AD-609 750 DIV. 12

•BECKER, WALTER C.
• • •
TECHNIQUES OF PHYSIOLOGICAL MONITORING. VOLUME III. SYSTEMS.
AD-609 981 DIV. 16

•BEEKMAN, EMILE
• • •
ELECTRONICALLY FUNCTIONAL ORGANIC MATERIALS.
AD-609 831 DIV. 25

•BELFORD, R. L.
• • •
A SHOCK TUBE WITH QUADRUPOLE MASS FILTER FOR MONITORING HIGH-TEMPERATURE REACTION KINETICS.
AD-609 775 DIV. 30

•BELLMAN, R. E.
• • •
NUMERICAL INTEGRATION OF A DIFFERENTIALDIFFERENCE EQUATION WITH A DECREASING TIMELAG,
AD-609 839 DIV. 15

•BENICE, R. J.
• • •
ERROR CONTROL THROUGH CODING. VOLUME V. ANALYSIS AND COMPARISON OF ERROR CONTROL TECHNIQUES.
AD-609 466 DIV. 8
• • •
ERROR CONTROL THROUGH CODING. VOLUME VI. THE DESIGN OF ERROR CONTROL SYSTEMS.
AD-609 468 DIV. 8

•BERKOVITZ, LEONARD D.
• • •
A DYNAMIC PROGRAMMING APPROACH TO THE NONPARAMETRIC PROBLEM IN THE CALCULUS OF VARIATIONS,
AD-609 699 DIV. 15

•BERLINER, DAVID C.
• • •
STUDY OF TRAINING PERFORMANCE EVALUATION TECHNIQUES.
AD-609 605 DIV. 23

•BERNSTEIN, IRWIN S.
• • •
RESEARCH IN THE RESTRICTED PROBLEMS OF THREE AND FOUR BODIES.
AD-609 613 DIV. 2

•BIARD, J. R.
• • •
OPTOELECTRONIC FUNCTIONAL ELECTRONIC BLOCKS.
AD-609 509 DIV. 8

•BIDERMAN, ALBERT D.
• • •
HISTORICAL INCIDENTS OF EXTREME OVERCROWDING.
AD-609 752 DIV. 32

•BINGLEY, F. J.
• • •
RESEARCH AND DEVELOPMENT ON PHOTOCONDUCTIVE PHOTOTAPE.
AD-609 768 DIV. 24

•BIRYUZOV, S. S.
• • •
REFLECTIONS ON THE ROLE OF THE COMMANDER,
AD-609 644 DIV. 18

•BLACHLY, C. H.
• • •
THE STABILIZATION OF MONOETHANOLAMINE SOLUTIONS FOR SUBMARINE CARBON DIOXIDE SCRUBBERS.
AD-609 888 DIV. 31

•BLANCHARD, WENDELL
• • •
U. S. ARMY AREA HANDBOOK FOR ETHIOPIA.
AD-609 549 DIV. 32
• • •
U. S. ARMY AREA HANDBOOK FOR COLOMBIA.
AD-609 556 DIV. 32

•BLOOM, MARTIN H.
• • •
FURTHER SIMILARITY SOLUTIONS OF WAKES AND JETS. PART I. TWO-DIMENSIONAL FLOWS. PART II. AXISYMMETRIC FLOWS,
AD-609 576 DIV. 9

•BLOOMFIELD, M.
• • •
ROLE OF THE TECHNICAL LIBRARY IN SUPPORT OF AN INFORMATION CENTER,
AD-609 825 DIV. 32

•BLUHM, JOSEPH I.
• • •
TEMPERATURE-STRAIN RATE AND THE BRITTLE FRACTURE PROBLEM.
AD-609 666 DIV. 17

•BLUM, J. F.
• • •
PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
AD-609 686 DIV. 8

•BOLLE, D. M.
• • •
A DIGITAL FERRITE PHASE SHIFTER. A STUDY OF THE DIFFERENTIAL PHASE SHIFT IN CIRCULAR CYLINDRICAL WAVEGUIDES CONTAINING CIRCUMFERENTIALLY MAGNETIZED FERRITE RODS AND TUBES UNDER TRANSVERSE ELECTRIC MODE EXCITATION,
AD-609 495 DIV. 8

•BOND, B. B.
• • •
TRECOM TECHNICAL REPORT 63-55; REVIEW OF.
AD-609 743 DIV. 27
• • •
EFFECTIVENESS OF THE SPECTROMETRIC OIL ANALYSIS METHOD FOR MONITORING AIRCRAFT MECHANISMS.
AD-609 746 DIV. 27

•BORISENKO, A. I.
• • •
GASDYNAMICS OF ENGINES
AD-609 452 DIV. 2

•BOSTON, NOEL E. J.
• • •
OBSERVATIONS OF TIDAL PERIODIC INTERNAL WAVES OVER A THREE DAY PERIOD OFF PANAMA CITY, FLORIDA.
AD-609 796 DIV. 2

•BOSWICK, D.
• • •
CRYOELECTRIC RANDOM ACCESS MEMORY, PHASE II 10(9) BIT MEMORY.
AD-609 469 DIV. 30

•BOUDREAU, R. J.
• • •
STUDIES IN IONIC COPOLYMERIZATION.
AD-609 697 DIV. 4

•BOYKIN, R. E.
• • •
NORTHEAST GULF OF MEXICO HYDROGRAPHIC SURVEY DATA COLLECTED IN 1963,
AD-609 719 DIV. 2

•BRADLEY, JOHN
• • •
STORM RADAR DATA PROCESSOR EVALUATION.
AD-609 820 DIV. 2

•BRADY, FRANCES A.
• • •
PROFESSIONAL PAPERS CLEARED FOR POSSIBLE PUBLICATION AND/OR PRESENTATION.
AD-609 569 DIV. 30

•BRAMFITT, BRUCE L.
• • •
A STUDY OF THE EFFECT OF SOLIDIFICATION IMPERFECTIONS ON THE TENSILE PROPERTIES OF CAST STEEL.
AD-609 491 DIV. 17

•BRANSCOMB, L. M.
• • •
CHANGES IN THE CHEMICAL COMPOSITION OF THE ATMOSPHERE FOLLOWING INTENSE IONIZATION IMPULSES.
AD-609 792 DIV. 2

•BRENIAK, E. F.
• • •
DEVELOPMENT OF A UHF POWER TRANSISTOR.
AD-609 626 DIV. 8

•BROWN, KIRK W.
• • •
VERTICAL FLUXES WITHIN THE VEGETATIVE CANOPY OF A CORN FIELD, 1962.
AD-609 740 DIV. 2

•BROWN, ROBERT N.
• • •
PROJECT BEARS (BACTERIOLOGICAL EFFECTS, AIRCRAFT REFUELING SYSTEMS).
AD-609 527 DIV. 10

•BRUCE, JOHN G. , JR.
• • •
DEEP CURRENT MEASUREMENTS NORTH OF PUERTO RICO,
AD-609 853 DIV. 2

•BRYANT, PAUL J.
• • •
THE STRUCTURE AND STRENGTH OF EPITAXIAL FILMS.
AD-609 730 DIV. 25

•BRYSON, A. E. , JR.
• • •
DIFFERENTIAL GAMES AND OPTIMAL PURSUITEVASION STRATEGIES
AD-609 772 DIV. 15

•BUELL, J. D.
• • •
NUMERICAL INTEGRATION OF A DIFFERENTIALDIFFERENCE EQUATION WITH A DECREASING TIMELAG,
AD-609 839 DIV. 15

•BURNS, L. L.
• • •
CRYOELECTRIC RANDOM ACCESS MEMORY, PHASE II 10(9) BIT MEMORY.
AD-609 469 DIV. 30

•C, WALTON,
• • •
MOMENTS OF INERTIA AND CENTERS OF GRAVITY OF THE LIVING HUMAN BODY ENCUMBERED BY A FULL-PRESSURE SUIT.
AD-609 863 DIV. 16

•CALLEN, H. B.
• • •
A PROBABILITY DENSITY COMMON TO MOLECULAR FIELD AND COLLECTIVE EXCITATION THEORIES OF FERROMAGNETISM.
AD-609 552 DIV. 25

•CANNON, E. T.
• • •
CRATERING PRODUCED IN METALS BY HIGHVELOCITY IMPACT
AD-609 641 DIV. 22

•CAREL, W. L.
• • •
JANAIR: JOINT ARMY-NAVY AIRCRAFT INSTRUMENTATION RESEARCH. ANALYSIS OF PICTORIAL DISPLAYS,
AD-609 762 DIV. 1

•CAROLAN, JAMES F.
• • •
VERTICAL ELECTRIC DIPOLE IN A TWO CONDUCTOR REGION.
AD-609 685 DIV. 2

•CARTERETTE, EDWARD C.
• • •
A SIMPLE LINEAR MODEL FOR VOWEL PERCEPTION,
AD-609 453 DIV. 16
• • •
LATERALIZATION OF SOUNDS AT THE UNSTIMULATED EAR OPPOSITE TO A NOISE-ADAPTED EAR.
AD-609 456 DIV. 28
• • •
THE DETECTION OF MARKOVIAN SEQUENCES OF SIGNALS.
AD-609 457 DIV. 28

•CHAIKEN, R. F.
• • •
RATE OF SUBLIMATION OF AMMONIUM HALIDES,
AD-609 814 DIV. 4

•CHANG, L.
• • •
INFRARED COATING STUDIES.
AD-609 779 DIV. 14

•CHAPPELL, T. E.
• • •
A METHOD FOR PREDICTING THERMAL RESPONSE IN SANDWICH PANELS.
AD-609 906 DIV. 13

•CHEN, KARL
• • •
FURTHER SIMILARITY SOLUTIONS OF WAKES AND JETS. PART I. TWO-DIMENSIONAL FLOWS. PART II. AXISYMMETRIC FLOWS,
AD-609 576 DIV. 9

•CHEN, SHIH-YUAN
• • •
INFLUENCES OF SMALL DIFFE RENCES IN BALLISTIC COEFFICIENT OF SATELLITE STATION KEEPING
AD-609 880 DIV. 12

•CHENG, H. M.
• • •
WAKE ANALYSIS OF SHIP MODELS TWIN-SCREW MILITARY TYPES,
AD-609 595 DIV. 9

•CHEY, YOUNG
• • •
EXPERIMENTAL DETERMINATION OF WAVEEXCITED FORCES AND MOMENTS ACTING ON A SHIP MODEL RUNNING IN OBLIQUE REGULAR WAVES,
AD-609 856 DIV. 9

•CHIEN, R. T.
• • •
ERROR CONTROL THROUGH CODING. VOLUME III. VARIABLE REDUNDANCY CODES.
AD-609 470 DIV. 8

• • •
ERROR CONTROL THROUGH CODING. VOLUME IV. RESIDUE CODES.
AD-609 472 DIV. 8

•CHIU, Y. P.
• • •
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
AD-609 437 DIV. 14

•CHLECK, D.
• • •
CHEMICAL-ELECTRICAL SENSING.
AD-609 721 DIV. 4

•CHRISTIANSEN, D. A.
• • •
CRYOELECTRIC RANDOM ACCESS MEMORY, PHASE II 10(9) BIT MEMORY.
AD-609 469 DIV. 30

•CHU, C. M.
• • •
THE RADAR CROSS SECTION OF AN IONIZED WAKE OF A HYPERSONIC BODY,
AD-609 512 DIV. 6

•CLOSE, R. T.
• • •
DIGITAL COMPUTER STUDIES OF ELECTRON GUNS.
AD-609 679 DIV. 8

•COCHRUN, BASIL L.
• • •
INVESTIGATION OF SOLID STATE DEVICES AND CIRCUITS.
AD-609 674 DIV. 8

•COHN, JEROME
• • •
THE ATTRIBUTE DERIVATION AND DISPLAY SYSTEM FOR THE EXPERIMENTAL DYNAMIC PROCESSOR.
AD-609 488 DIV. 30

•CONNOR, J. J. JR.
• • •
BUCKLING CHARACTERISTICS OF THIN CYLINDRICAL SHELLS SUBJECTED TO AXIAL COMPRESSION AND INTERNAL PRESSURE.
AD-609 688 DIV. 25

•COOKSON, JOHN A.
• • •
U. S. ARMY AREA HANDBOOK FOR THE REPUBLIC OF THE SUDAN.
AD-609 590 DIV. 32

•COOLEY, GARY M.
• • •
IDENTIFYING RESEARCH CHARACTERISTICS IN HIGH SCHOOL STUDENTS, A SECOND STUDY,
AD-609 485 DIV. 23

•CORR, F. P.
• • •
ERROR CONTROL THROUGH CODING. VOLUME VII. ADAPTIVE ERROR CONTROL SYSTEMS.
AD-609 473 DIV. 8

• • •
ERROR CONTROL THROUGH CODING. VOLUME VIII. EXPERIMENTAL VERIFICATION AND OTHER STUDIES.
AD-609 474 DIV. 8

•COSENTINO, L. S.
• • •
CRYOELECTRIC RANDOM ACCESS MEMORY, PHASE II 10(9) BIT MEMORY.
AD-609 469 DIV. 30

•COTIU, A.
• • •
RUNGE-KUTTA TYPE PROCEDURES OF ORDER OF ACCURACY N + 4 (N>2) WITH THREE NODES FOR NUMERICAL INTEGRATION OF FIRST-ORDER DIFFERENTIAL EQUATIONS
AD-609 692 DIV. 15

•COUCH, ROBERT P.
• • •
APPLICATION OF RADIOISOTOPE LIQUID LEVEL GAGES AT THE AIR FORCE ROCKET PROPULSION LABORATORY,
AD-609 836 DIV. 27

•CRAM, DONALD J.
• • •
MODELS FOR ASYMMETRIC INDUCTION IN POLYMERIZATION.
AD-609 598 DIV. 4

•CREMERS, C. J.
• • •
THERMAL CHARACTERISTICS OF A HIGH AND LOW MASS FLUX ARGON PLASMA JET.
AD-609 622 DIV. 25

•CROUSE, GEORGE
• • •
INJURY OF THE SKIN.
AD-609 860 DIV. 16

•CRUMP, S. F.
• • •
CRITICAL PRESSURES FOR THE INCEPTION OF CAVITATION IN A LARGE-SCALE NUMACHI NOZZLE AS INFLUENCED BY THE AIR CONTENT OF THE WATER,
AD-609 629 DIV. 9

•CUCCHIARA, O.
• • •
CHEMICAL-ELECTRICAL SENSING.
AD-609 721 DIV. 4

•CULLER, G. J.
• • •
THE TRW TWO-STATION, ON-LINE SCIENTIFIC COMPUTER.
AD-609 720 DIV. 30

•CUTLER, IVAN B.
• • •
DIELECTRIC LOSS IN MGO AND SAPPHIRE.
AD-609 617 DIV. 25

•D, SANTSCHI,
• • •
MOMENTS OF INERTIA AND CENTERS OF GRAVITY OF THE LIVING HUMAN BODY ENCUMBERED BY A FULL-PRESSURE SUIT.
AD-609 863 DIV. 16

•DALTON, CHARLES
• • •
SEPARATION IN A NON-UNIFORM SHEAR FLOW,
AD-609 778 DIV. 9

•DAMON, P. P.
• • •
RESEARCH AND DEVELOPMENT OF TWO-COLOR DIRECT VIEW STORAGE TUBE WITH SELECTIVE ERASURE.
AD-609 491 DIV. 8

•DAVIDSON, THEODORE
• • •
COMPARISON OF EXTENDED POLYETHYLENE AND CHRYSOTILE ASBESTOS FRACTURE SURFACES.
AD-609 608 DIV. 14

•DAVIS, PAUL A.
• • •
ANALYSIS OF DAYTIME RADIATION DATA FROM TIROS IV.
AD-609 767 DIV. 2

•DAVIS, R. W.
• • •
EVALUATION OF B AND D SUMMATION TRACES AT THE TONTO FOREST SEISMOLOGICAL OBSERVATORY.
AD-609 931 DIV. 2

•DAY, W. B.
• • •
INDUCTIVE PLASMA ACCELERATION RESEARCH.
AD-609 728 DIV. 27

•DE KLERK, JOHN
• • •
SOME RECENT ADVANCES IN MICROWAVE PHONON GENERATION AND DETECTION WITH APPLICATIONS TO THE STUDY OF PHONON-LATTICE INTERACTIONS IN DIELECTRIC MATERIALS.
AD-609 479 DIV. 25

•DEAVERS, K. L.
• • •
PRODUCT IMPROVEMENT CANDIDATE SELECTION AND MANAGEMENT INFOR MATION.
AD-609 793 DIV. 18

•DECHARMS, RICHARD
• • •
STRUCTURAL FACTORS AND INDIVIDUAL NEEDS IN GROUP BEHAVIOR.
AD-609 446 DIV. 28

•DECICCO, GABRIEL
• • •
U. S. ARMY AREA HANDBOOK FOR BRAZIL,
AD-609 483 DIV. 18

•DEMETER, L. J.
• • •
INDUCTIVE PLASMA ACCELERATION RESEARCH.
AD-609 728 DIV. 27

•DERENTHAL, R. J.
• • •
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME I. SYSTEM DESCRIPTION AND ANALYSIS.
AD-609 750 DIV. 12

•DERVISOGLU, AHMET
• • •
STATE MODELS OF ACTIVE RLC NETWORKS,
AD-609 700 DIV. 8

•DIMATTIA, ALFRED L.
• • •
PERSONNEL COMMUNICATIONS IN SPACE. A STUDY OF SPEECH TRANSMISSION AND HELMET COMFORT.
AD-609 604 DIV. 29

•DIRKSE, THEDFORD P.
• • •
LOW TEMPERATURE CYCLING BEHAVIOR OF THE SILVER ELECTRODE.
AD-609 876 DIV. 7

•DISHUKES, EDWARD B.
• • •
A STUDY OF THE DIFFUSIVITY OF IRON IN LIQUID SLAGS.
AD-609 459 DIV. 17

•DOLOV, A. A.
• • •
ELECTRIC AND MAGNETIC PROPERTIES OF THERMALLY TREATED FERROCENE BASE POLYMERS,
AD-609 782 DIV. 4

•DONALDSON, COLMAN DUP.
• • •
AN EXPERIMENTAL STUDY OF TURBULENCE IN A DRIVEN VORTEX,
AD-609 460 DIV. 9

•DOODY, P.
• • •
THERMAL EMISSION OF NEUTRAL CESIUM.
AD-609 984 DIV. 25

•DOWNER, THOMAS M. , JR.
• • •
THE DETERMINATION OF CHLORINE AND IONIC CHLORIDE IN ORGANIC COMPOUNDS.
AD-609 650 DIV. 4

•DOXTATER, LOUISE
• • •
TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY AND LEARNING.
AD-609 811 DIV. 28

•DREYFUS, STUART E.
• • •
A DYNAMIC PROGRAMMING APPROACH TO THE NONPARAMETRIC PROBLEM IN THE CALCULUS OF VARIATIONS,
AD-609 699 DIV. 19

•DU MANOIR, PIERRE
• • •
COMPUTER ANALYSIS OF THE HEAT FLOW IN THE VACUUM ARC MELTING OF MOLYBDENUM
AD-609 691 DIV. 17

•DUFOUR, H. R.
• • •
STUDIES OF LOW-TEMPERATURE OXIDATION REACTIONS.
AD-609 800 DIV. 4

•DUKE, W. M.
• • •
ERROR ANALYSIS CONSIDERATIONS FOR A SATELLITE RENDEZVOUS
AD-609 484 DIV. 12

•DURNIN, RODNEY E.
• • •
PERFORMANCE FLIGHT TESTING THEORY,
AD-609 489 DIV. 1

•D'ANTONIO, R. A.
• • •
COMMUNICATION CHARACTERISTICS OF AN UNDERWATER ACOUSTIC SIGNAL REFLECTED FROM A SPACE AND TIME RANDOM SURFACE.
AD-609 627 DIV. 5

•EAKINS, WILLIAM J.
• • •
GLASS/RESIN INTERFACE: PATENT SURVEY, PATENT LIST, AND GENERAL BIBLIOGRAPHY,
AD-609 526 DIV. 14

•ECKERT, ERNST R. G.
• • •
THERMODYNAMIC PROPERTIES OF CARBONNITROGEN MIXTURES AT HIGH TEMPERATURES.
AD-609 670 DIV. 25

•EDER, K. CHARLES
• • •
SOLID STATE TACAN.
AD-609 810 DIV. 19

•EDWARDS, EDWARD V.
• • •
EFFECT OF MAGNETIC FIELDS ON MICROWAVE GAS-DISCHARGE DUPLEXER CHARACTERISTICS,
AD-609 658 DIV. 8

•ELDER, F. K. , JR.
• • •
DEEXCITATION OF HELIUM ATOMS IN THE METASTABLE TRIPLET STATE (2-3S) IN PURE HELIUM.
AD-609 832 DIV. 4

•ELKON, YAAKOV
• • •
STUDIES ON THE INSTABILITY OF CIRCULAR RINGS,
AD-609 903 DIV. 13

•ELLISON, ROBERT
• • •
IDENTIFYING RESEARCH CHARACTERISTICS IN HIGH SCHOOL STUDENTS, A SECOND STUDY.
AD-609 485 DIV. 23

•ERICKSON, J. C. , JR.
• • •
ON THE THEORY OF THE LOW-ASPECT-RATIO JET-FLAP HYDROFOIL.
AD-609 729 DIV. 9

•ERMA, VICTOR A.
• • •
A FUNDAMENTAL THEORETICAL AND EXPERIMENTAL STUDY OF ROTARY MAGNETOHYDRODYNAMICS
AD-609 812 DIV. 25

•ERSHOV, M. F.
• • •
EQUILIBRIUM OF FLEXIBILE FLASTIC-PLASTIC SHELLS AND PLATES,
AD-609 786 DIV. 25

•ESPOSITO, GEORGE G.
• • •
DETERMINATION OF STYRENE MONOMER IN POLYESTER RESINS BY GAS-LIQUID CHROMATOGRAPHY.
AD-609 664 DIV. 4

•EVANS, DONALD J.
• • •
ELECTRICAL RESISTIVITY OF NIOBIUMZIRCONIUM ALLOYS BELOW 273.2K.
AD-609 798 DIV. 17

•EVANS, THOMAS G.
• • •
A PROGRAM FOR THE SOLUTION OF A CLASS OF GEOMETRIC-ANALOGY INTELLIGENCE-TEST QUESTIONS.
AD-609 845 DIV. 30

•EYRING, HENRY
• • •
STUDIES TO DETERMINE THE MECHANISM OF PRODUCTION AND REMOVAL OF ELECTRONS IN FLAMES.
AD-609 515 DIV. 10

•F, SCOTT, AND
• • •
MOMENTS OF INERTIA AND CENTERS OF GRAVITY OF THE LIVING HUMAN BODY ENCUMBERED BY A FULL-PRESSURE SUIT.
AD-609 863 DIV. 16

•FAHEY, NORBERT H.
• • •
THE EFFECT OF SPECIMEN GEOMETRY ON DETERMINATION OF ELONGATION IN SHEET TENSILE SPECIMENS.
AD-609 689 DIV. 17

•FALVEY, JOHN
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME I. SIMULATION OF 473L SYSTEM OVER A RANGE OF OPERATING CONDITIONS.
AD-609 763 DIV. 18
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME II. SIMCON AND SIMSCRIPT SIUMLATION TECHNIQUES; A COMPARISON.
AD-609 764 DIV. 18
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME III. ANALYSIS OF SERIAL AND PARALLEL FILE STRUCTURES.
AD-609 765 DIV. 18

•FEJER, J.
• • •
CRYOELECTRIC RANDOM ACCESS MEMORY, PHASE II 10(9) BIT MEMORY.
AD-609 969 DIV. 30

•FELCH, I.
• • •
ATOMIC OSCILLATOR DEVICE FOR NAVIGATIONGUIDANCE.
AD-609 776 DIV. 8

•FERRON, JOHN R.
• • •
MEASUREMENT AND PREDICTION OF DIFFUSIVITIES TO 1700K IN BINARY SYSTEMS CONTAINING CARBON DIOXIDE.
AD-609 597 DIV. 25

•FEUER, HENRY
• • •
RESEARCH IN NITROMONOMERS AND THEIR APPLICATION TO SOLID SMOKELESS PROPELLANTS.
AD-609 852 DIV. 10

•FIEGENBUTZ, L. V.
• • •
COMBUSTION CHARTS FOR HIGH ENERGY FUELS. II. A DESCRIPTION OF A GENERAL METHOD FOR CALCULATING EQUILIBRIUM CONCENTRATIONS OF COMBUSTION PRODUCTS,
AD-609 592 DIV. 10

•FIELD, E. C.
• • •
THE TRW TWO-STATION, ON-LINE SCIENTIFIC COMPUTER.
AD-609 720 DIV. 30

•FIRESTONE, STANLEY
• • •
MAGNETIC PROPERTIES OF ELECTRODEPOSITED NICKEL-IRON-COBALT FILMS,
AD-609 829 DIV. 17

•FLANNERY, W. T.
• • •
BRIDGED 'T' EXTENSION.
AD-609 479 DIV. 8

•FLOOD, WALTER A.
• • •
PROJECT WIDE BAND.
AD-609 619 DIV. 6

•FOLIAS, EFTHYMIOS C.
• • •
THE STRESSES IN A CYLINDRICAL SHELL CONTAINING AN AXIAL CRACK,
AD-609 669 DIV. 25

•FOSDICK, GEORGE E.
• • •
AN ANALYTICAL STUDY OF THE EFFECTS OF OBLATENESS ON SATELLITE ORBITS,
AD-609 519 DIV. 12

•FOSSUM, EARL G.
• • •
MULTI-LIST SYSTEM: ADDITIONAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 709 DIV. 32
• • •
MULTI-LIST SYSTEM: FINAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 710 DIV. 32

•FRANCIS, G. F.
• • •
STUDY OF AUTOMATIC CALIBRATION OF SEISMOGRAPH SYSTEMS.
AD-609 930 DIV. 2

•FRANCIS, GEORGE F.
• • •
TONTO FOREST SEISMOLOGICAL OBSERVATORY. LINEAR ARRAY PROGRESS.
AD-609 928 DIV. 2

•FRAZIER, FRANK D.
• • •
PERFORMANCE FLIGHT TESTING THEORY,
AD-609 489 DIV. 1

•FREIMAN, C. V.
• • •
ERROR CONTROL THROUGH CODING. VOLUME II. RECURRENT BURST-ERROR-CORRECTING CODES.
AD-609 467 DIV. 8

•FRENCH, F. W.
• • •
VULNERABILITY OF MANNED ORBITAL COMMAND POSTS TO NATURAL SPACE RADIATIONS,
AD-609 501 DIV. 12

•FREY, A. H. , JR.
• • •
ERROR CONTROL THROUGH CODING. VOLUME V. ANALYSIS AND COMPARISON OF ERROR CONTROL TECHNIQUES.
AD-609 966 DIV. 8
• • •
ERROR CONTROL THROUGH CODING. VOLUME VI. THE DESIGN OF ERROR CONTROL SYSTEMS.
AD-609 968 DIV. 8
• • •
ERROR CONTROL THROUGH CODING. VOLUME VII. ADAPTIVE ERROR CONTROL SYSTEMS.
AD-609 973 DIV. 8
• • •
ERROR CONTROL THROUGH CODING. VOLUME VIII. EXPERIMENTAL VERIFICATION AND OTHER STUDIES.
AD-609 974 DIV. 8

•FRIED, B. D.
• • •
THE TRW TWO-STATION, ON-LINE SCIENTIFIC COMPUTER.
AD-609 720 DIV. 20

•FRIEDMAN, MORTON P.
• • •
LATERALIZATION OF SOUNDS AT THE UNSTIMULATED EAR OPPOSITE TO A NOISE-ADAPTED EAR.
AD-609 956 DIV. 28
• • •
THE DETECTION OF MARKOVIAN SEQUENCES OF SIGNALS.
AD-609 957 DIV. 28

•FUENO, TAKAYUKI
• • •
STUDIES TO DETERMINE THE MECHANISM OF PRODUCTION AND REMOVAL OF ELECTRONS IN FLAMES.
AD-609 915 DIV. 10

•GAGAN, RICHARD
• • •
THE ATTRIBUTE DERIVATION AND DISPLAY SYSTEM FOR THE EXPERIMENTAL DYNAMIC PROCESSOR.
AD-609 988 DIV. 20

•GALBIATI, L. J.
• • •
PROCEEDINGS OF THE TROPOS' PHERIC REFRACTION EFFECTS MEETING (NO. 2). VOLUME I. RESULTS AND STATUS OF TROPOSPHERIC-EFFECTS MEASUREMENT PROGRAM.
AD-609 721 DIV. 8

•GAMSIA, ADRIANO M.
• • •
AN IMBEDDING OF CLOSED RIEMANN SURFACES IN EUCLIDEAN SPACE,
AD-609 866 DIV. 19

•GATES, D. C.
• • •
INDUCTIVE PLASMA ACCELERATION RESEARCH.
AD-609 728 DIV. 27

•GATOS, H. C.
• • •
METALLURGICAL ASPECTS OF GAAS-GE HETEROJUNCTIONS.
AD-609 611 DIV. 17

•GAUL, R. D.
• • •
NORTHEAST GULF OF MEXICO HYDROGRAPHIC SURVEY DATA COLLECTED IN 1963,
AD-609 719 DIV. 2

•GERRISH, HAROLD P.
• • •
A MODEL OF ATMOSPHERIC REFRACTIVITY AND THEORETICAL HEIGHTS OF RADIO-RADAR RAYS FOR MIAMI, FLORIDA,
AD-609 921 DIV. 8

•GIANGRANDE, RUDOLPH V.
• • •
ELECTROMAGNETIC TEST CONTROL REQUIREMENTS,
AD-609 938 DIV. 20

•GIBBONS, EDWARD F.
• • •
INDUCTIVE PLASMA HEATING USING A MULTITURN COIL.
AD-609 829 DIV. 25

•GIBSON, W. A.
• • •
A LATENT STRUCTURE FOR THE SIMPLEX,
AD-609 676 DIV. 28

•GIESE, GRAHAM
• • •
EROSION OF THE CLIFFS OF OUTER CAPE COD: TABLES AND GRAPHS,
AD-609 839 DIV. 2

•GILES, GRADY E.
• • •
LOW-NOISE L-BAND AMPLIFIER.
AD-609 994 DIV. 8

•GILMOUR, SUSAN E.
• • •
U. S. ARMY AREA HANDBOOK FOR BRAZIL,
AD-609 983 DIV. 18

•GLASER, ROBERT
• • •
AN EVALUATION OF MULTIPLE TRACKS IN A LINEAR PROGRAM.
AD-609 801 DIV. 23
• • •
LEARNING SET FORMATION IN PROGRAMMED INSTRUCTION.
AD-609 802 DIV. 23

•GODWIN, ORGLE D.
• • •
PERFORMANCE FLIGHT TESTING THEORY,
AD-609 989 DIV. 1

•GOLDBERG, E. A.
• • •
ERROR ANALYSIS CONSIDERATIONS FOR A SATELLITE RENDEZVOUS
AD-609 984 DIV. 12

•GOLDEN, SIDNEY
• • •
ON THE COMPOSITION OF DILUTE ALKALI METALAMMONIA SOLUTIONS.
AD-609 978 DIV. 4

•GOMM, THIEL J.
• • •
SOLID STATE TACAN.
AD-609 810 DIV. 19

•GRAY, J. DON
• • •
LAMINAR BOUNDARY-LAYER SEPARATION ON FLARED BODIES AT SUPERSONIC AND HYPERSONIC SPEEDS,
AD-609 841 DIV. 9

•GRAY, S.
• • •
RESEARCH AND DEVELOPMENT ON PHOTOCONDUCTIVE PHOTO-TAPE.
AD-609 768 DIV. 24

•GREEN, P. E. , JR.
• • •
A LARGE APERTURE SEISMIC ARRAY.
AD-609 851 DIV. 6

•GREENE, N. D.
• • •
INVESTIGATION OF THE FUNDAMENTAL ELECTROCHEMICAL PARAMETERS INFLUENCING FUEL CELL PERFORMANCE.
AD-609 718 DIV. 7

•GREENSPAN, JACOB
• • •
DEVELOPMENT OF A STRUCTURAL URANIUM ALLOY,
AD-609 994 DIV. 17

•GREENSPON, JOSHUA E.
• • •
APPROXIMATION TO THE MEAN SQUARE FARFIELD PRESSURE OF RANDOMLY VIBRATING STRUCTURES AT LOW FREQUENCIES.
AD-609 634 DIV. 25
• • •
EFFECT OF EXTERNAL OR INTERNAL STATIC PRESSURE ON THE NATURAL FREQUENCIES OF UNSTIFFENED, CROSS STIFFENED, AND SANDWICH CYLINDRICAL SHELLS.
AD-609 635 DIV. 25
• • •
RANDOM LOADING AND RADIATION FROM STIFFENED AND SANDWICH TYPE CYLINDRICAL SHELL STRUCTURES. PART II, UNSYMMETRICAL LOADING WITH KNOWN SPACE DISTRIBUTION.
AD-609 636 DIV. 25

•GREER, P. H.
• • •
ELECTRONIC PARTS-ACCELERATED LIFE TESTS.
AD-609 808 DIV. 8

•GRESZCZUK, L. B.
• • •
STUDY OF RESIDUAL STRESSES IN THICK GLASS FILAMENT REINFORCED LAMINATES.
AD-609 610 DIV. 19

•GREY, JERRY
• • •
ANALYTICAL-EXPERIMENTAL CORRELATION OF RADIATION LOSS FROM AN ARGON ARCJET.
AD-609 722 DIV. 25

•GROW, R. W.
• • •
CRATERING PRODUCED IN METALS BY HIGHVELOCITY IMPACT
AD-609 691 DIV. 22

•GUNDERSON, E. K. ERIC
• • •
PERSONAL HISTORY CORRELATES OF MILITARY PERFORMANCE AT A LARGE ANTARCTIC STATION
AD-609 942 DIV. 28
• • •
VARIABILITY IN FACTOR STRUCTURES OF CLINICIANS' PERSONALITY RATINGS,
AD-609 945 DIV. 28
• • •
PERFORMANCE EVALUATIONS OF ANTARCTIC VOLUNTEERS,
AD-609 946 DIV. 28

•GUTMAN, DAVID
• • •
A SHOCK TUBE WITH QUADRUPOLE MASS FILTER FOR MONITORING HIGH-TEMPERATURE REACTION KINETICS.
AD-609 779 DIV. 20

•GUTTMAN, CHARLES
• • •
ON THE COMPOSITION OF DILUTE ALKALI METALAMMONIA SOLUTIONS.
AD-609 978 DIV. 4

•HAASE, R. H.
• • •
ANALYSIS OF SOME LAND TRANSPORTATION VEHICLES, TODAY AND TOMORROW,
AD-609 759 DIV. 11

•HADLER, J. B.
• • •
WAKE ANALYSIS OF SHIP MODELS TWIN-SCREW MILITARY TYPES,
AD-609 995 DIV. 9

•HAMBLIN, ROBERT L.
• • •
STRUCTURAL FACTORS AND INDIVIDUAL NEEDS IN GROUP BEHAVIOR.
AD-609 996 DIV. 28

•HAMBURGER, P.
• • •
EFFICIENCY OF A ROUTING SCHEME IN A MOBILE DATA PROCESSING COMMUNICATION NETWORK,
AD-609 774 DIV. 8

•HAMEL, B. B.
• • •
RESEARCH ON HYPERSONIC RAREFIED PLASMA FLOWS.
AD-609 496 DIV. 9

•HAMILL, A. T.
• • •
PRODUCTION ENGINEERING MEASURE: IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE RELIABILITY OF SILICON PLANAR EPITAXIAL: TRANSISTOR (WX-4001), LOGIC GATE (WM-201), FLIPFLOP (WM-202), AC BINARY (WM-213).
AD-609 445 DIV. 8

•HANNA, ALFRED E.
• • •
MIGRATION OF FUSED FALLOUT SIMULANT INTO SOILS,
AD-609 645 DIV. 20

•HANSEN, GILBERT J.
• • •
A HEURISTIC APPROACH TO SOLUTION OF CHECKERBOARD PUZZLES,
AD-609 570 DIV. 30

•HANSEN, K. F.
• • •
VULNERABILITY OF MANNED ORBITAL COMMAND POSTS TO NATURAL SPACE RADIATIONS,
AD-609 501 DIV. 12

•HAPAKAS, THEODORE
• • •
AN EVALUATION OF MULTIPLE TRACKS IN A LINEAR PROGRAM.
AD-609 801 DIV. 23

•HARP, R. S.
• • •
A STUDY OF THE PLASMA BOUNDARY.
AD-609 567 DIV. 25

•HARRAH, L. A.
• • •
THE RADIATION CHEMISTRY OF ACETYLENIC COMPOUNDS.
AD-609 440 DIV. 4

•HARRIS, GEORGE L.
• • •
U. S. ARMY AREA HANDBOOK FOR JAPAN,
AD-609 551 DIV. 32

•HARRISON, DON E. , JR.
• • •
TABLE OF THE DEBYE FUNCTIONS
AD-609 702 DIV. 25

•HASTERLIK, ROBERT J.
• • •
THE CONSEQUENCES OF INGESTION BY MAN OF REAL AND SIMULATED FALLOUT,
AD-609 624 DIV. 16

•HAUSNER, ARTHUR
• • •
ANALOG COMPUTER TECHNIQUES FOR PROBLEMS IN COMPLEX VARIABLES
AD-609 733 DIV. 30

•HAWTHORNEAND , J. R.
• • •
YANKEE REACTOR PRESSURE VESSEL SURVEILLANCE: EVALUATION OF SPECIMENS EXPOSED DURING THE SECOND CORE,
AD-609 565 DIV. 20

•HAY, ARTHUR J.
• • •
A SHOCK TUBE WITH QUADRUPOLE MASS FILTER FOR MONITORING HIGH-TEMPERATURE REACTION KINETICS.
AD-609 775 DIV. 30

•HAYCOCK, O. C.
• • •
ROCKET MEASUREMENTS WITH ELECTRON AND ION PROBES IN AN AURORA.
AD-609 454 DIV. 2

•HEID, T. L.
• • •
STRUCTURAL DESIGN FOR FUEL CONTAINMENT UNDER SURVIVABLE CRASH CONDITIONS.
AD-609 615 DIV. 1

•HELLER, G. S.
• • •
A DIGITAL FERRITE PHASE SHIFTER. A STUDY OF THE DIFFERENTIAL PHASE SHIFT IN CIRCULAR CYLINDRICAL WAVEGUIDES CONTAINING CIRCUMFERENTIALLY MAGNETIZED FERRITE RODS AND TUBES UNDER TRANSVERSE ELECTRIC MODE EXCITATION,
AD-609 495 DIV. 8

•HELPERT, E. P.
• • •
COMPATIBLE ACTIVE THIN-FILM INTEGRATED STRUCTURES.
AD-609 461 DIV. 8

•HENDRIX, GEORGE D.
• • •
PERFORMANCE FLIGHT TESTING THEORY,
AD-609 489 DIV. 1

•HERRMANN, WALTER
• • •
A LAGRANGIAN FINITE DIFFERENCE METHOD FOR TWO-DIMENSIONAL MOTION INCLUDING MATERIAL STRENGTH.
AD-609 523 DIV. 25

•HIDA, KINZO
• • •
EXTENSION OF THE M2- AND THE THIN-WING EXPANSION METHODS TO MAGNETOHYDRODYNAMICS.
AD-609 568 DIV. 9

•HILL, JOHN P.
• • •
PRESERVATIVE TREATMENT OF WOOD FOR COMBAT VEHICLES.
AD-609 663 DIV. 14

•HILL, R. F.
• • •
COMMUNICATION CHARACTERISTICS OF AN UNDERWATER ACOUSTIC SIGNAL REFLECTED FROM A SPACE AND TIME RANDOM SURFACE.
AD-609 627 DIV. 5

•HIRSCH, ABRAHAM M.
• • •
U. S. ARMY AREA HANDBOOK FOR ETHIOPIA.
AD-609 549 DIV. 32
• • •
U. S. ARMY AREA HANDBOOK FOR COLOMBIA.
AD-609 556 DIV. 32

•HLAVACEK, IVAN
• • •
NONSYMMETRICAL BUCKLING OF A FLAT ROUNDED SHELL WITH INITIAL DEFORMATION FROM EXTERNAL PRESSURE.
AD-609 780 DIV. 25

•HO, YU-CHI
• • •
DIFFERENTIAL GAMES AND OPTIMAL PURSUITEVASION STRATEGIES
AD-609 772 DIV. 15
• • •
AN EXPONENTIALLY CONVERGENT AND FINITE ALGORITHM FOR LINEAR INEQUALITIES,
AD-609 777 DIV. 15

•HODGE, D. B.
• • •
THE BORN APPROXIMATION APPLIED TO ELECTROMAGNETIC SCATTERING FROM A FINITE CONE.
AD-609 729 DIV. 25

•HODGES, L. R. , JR.
• • •
PRODUCTION ENGINEERING MEASURE. YIG SPHERES AND LIMITERS.
AD-609 661 DIV. 8

•HODOWANEC, G.
• • •
A LOW-NOISE, MULTIPLE-FUNCTION, X-BAND TRAVELING-WAVE TUBE.
AD-609 972 DIV. 8

•HOFFMAN, G. H.
• • •
SOLUTION OF THE INVISCID FLOW DUE TO DISPLACEMENT BY THE METHOD OF INTEGRAL RELATIONS.
AD-609 869 DIV. 9

•HOFFMAN, GEORGE A.
• • •
THE AUTOMOBILE-TODAY AND TOMORROW,
AD-609 753 DIV. 11
• • •
AUTOMOBILES: TODAY AND TOMORROW,
AD-609 757 DIV. 11

•HOLTZ, F. C.
• • •
VANADIUM ALLOY STUDIES.
AD-609 727 DIV. 17

•HOLZMAN, A. G.
• • •
AN EVALUATION OF MULTIPLE TRACKS IN A LINEAR PROGRAM.
AD-609 801 DIV. 23

•HOPKINS, F. W.
• • •
SYSTEM INSTALLATION AND TESTING,
AD-609 477 DIV. 18

•HORST, PAUL
• • •
PSYCHOLOGICAL MEASUREMENT AND PREDICTION. PART III, THE STRUCTURE OF TESTS,
AD-609 516 DIV. 28

•HOUGH, G. R.
• • •
ON THE THEORY OF THE LOW-ASPECT-RATIO JET-FLAP HYDROFOIL.
AD-609 729 DIV. 9

•HOWELL, DAVID W.
• • •
A FIXED-VOLTAGE POWER SUPPLY FOR TRANSISTOR CIRCUITS.
AD-609 447 DIV. 8

•HSIEH, EDWARD P. C.
• • •
ALGORITHM FOR SOLVING VOLTERRA INTEGRAL EQUATIONS MET IN PROCESS IDENTIFICATION.
AD-609 869 DIV. 15

•HUANG, C.
• • •
PRECISION VOLUME RESISTOR.
AD-609 623 DIV. 8

•HUFFMAN, ROBERT E.
• • •
AUTOIONIZATION SPECTRA OF GASES OBSERVED IN THE VACUUM ULTRAVIOLET.
AD-609 849 DIV. 25

•HUMMER, C. W. , JR.
• • •
CORROSION OF METALS IN TROPICAL ENVIRONMENTS. PART 6. ALUMINUM AND MAGNESIUM.
AD-609 618 DIV. 17

•HUNTER, R. W.
• • •
RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES, PHASE II.
AD-609 744 DIV. 8

•HUSS, HARRY O.
• • •
VALUE ANALYSIS (VALUE ENGINEERING). A TECHNIQUE FOR OBTAINING MORE VALUE FOR THE DEFENSE DOLLAR.
AD-609 520 DIV. 18

•HUTCHINS, CHARLES W. , JR.
• • •
AN INVESTIGATION OF UNPRE DICTED DIFFERENCES IN ATTRITION RATES AMONG STUDENTS FROM DIFFERENT PROCUREMENT SOURCES.
AD-609 668 DIV. 23

•IBELE, WARREN E.
• • •
THERMODYNAMIC PROPERTIES OF CARBONNITROGEN MIXTURES AT HIGH TEMPERATURES.
AD-609 670 DIV. 25

•IGARASHI, MAKOTO
• • •
COMPARATIVE HISTOLOGICAL STUDY OF THE REINFORCED AREA OF THE SACCULAR MEMBRANE IN MAMMALS.
AD-609 943 DIV. 16

•ILIFF, ROBERT L.
• • •
LASER ACTIVITIES AND BACKGROUND RADIATION STUDIES.
AD-609 759 DIV. 25

•IRGON, J.
• • •
PROPERTIES OF BUOYANT MATERIALS AND STRUCTURES.
AD-609 821 DIV. 14

•JACOBS, PAUL F.
• • •
ANALYTICAL-EXPERIMENTAL CORRELATION OF RADIATION LOSS FROM AN ARGON ARCJET.
AD-609 722 DIV. 25

•JAFFE, N. A.
• • •
SOLUTIONS OF THE MAGNETOFLUID-DYNAMIC BOUNDARY-LAYER EQUATIONS FOR A FLAT PLATE WITH A MOVING TRANSVERSE MAGNETIC FIELD SOURCE OR CROSSED ELECTRIC FIELD IN THE SPANWISE DIRECTION
AD-609 534 DIV. 9

•JEFFREY, RICHARD C.
• • •
PREFERENCE, CREDENCE, AND UTILITY,
AD-609 560 DIV. 15

•JOHN, HOWARD J.
• • •
U. S. ARMY AREA HANDBOOK FOR THE REPUBLIC OF THE SUDAN.
AD-609 550 DIV. 32

•JOHN, R. R.
• • •
CALIBRATION OF A PLASMA JET FACILITY FOR SIMULATION OF BALLISTIC MISSILE RE-ENTRY
AD-609 593 DIV. 12

•JOHNSON, D. K.
• • •
CRATERING PRODUCED IN METALS BY HIGHVELOCITY IMPACT
AD-609 641 DIV. 22

•JOHNSON, GEORGE D.
• • •
LOW-NOISE L-BAND AMPLIFIER.
AD-609 494 DIV. 8

•JOHNSON, HAROLD H.
• • •
ABSOLUTE EQUIVALENCE OF EXTERIOR DIFFERENTIAL SYSTEMS.
AD-609 687 DIV. 15

•JOHNSON, L.
• • •
ATOMIC OSCILLATOR DEVICE FOR NAVIGATIONGUIDANCE.
AD-609 776 DIV. 8

•JOKSCH, H.
• • •
THE MINIMUM NUMBER OF LINEAR DECISION FUNCTIONS TO IMPLEMENT A DECISION PROCESS
AD-609 476 DIV. 15

•JONES, BILLY P.
• • •
THERMAL DESIGN TESTS OF THE IGY SATELLITE. (PAYLOAD FOR MISSILE NO. 16),
AD-609 941 DIV. 12

•JU, F. D.
• • •
STUDY OF DISLOCATION FAILURE PHENOMENA IN UNIFORM RADIAL AND TENSILE FIELDS
AD-609 859 DIV. 25

•JUHASZ, C.
• • •
PROPERTIES OF BUOYANT MATERIALS AND STRUCTURES.
AD-609 821 DIV. 14

•KAFALAS, P.
• • •
THE INVESTIGATION OF PASSIVE LASER QSWITCHING.
AD-609 643 DIV. 25

•KAHAN, ALFRED
• • •
DISPERSION ANALYSIS OF OPTICAL REFLECTIVITY.
AD-609 847 DIV. 25

•KAIN, J. F.
• • •
A MULTIPLE EQUATION MODEL OF HOUSEHOLD LOCATIONAL AND TRIPMAKING BEHAVIOR,
AD-609 758 DIV. 33
• • •
A FIRST APPROXIMATION TO A RAND MODEL FOR STUDY OF URBAN TRANSPORTATION,
AD-609 771 DIV. 33

•KALABA, R. E.
• • •
NUMERICAL INTEGRATION OF A DIFFERENTIALDIFFERENCE EQUATION WITH A DECREASING TIMELAG,
AD-609 835 DIV. 15

•KAPANY, N. S.
• • •
LONG WAVELENGTH INFRARED FIBER OPTICS.
AD-609 842 DIV. 14

•KAPFER, EDGAR L.
• • •
VARIABILITY IN FACTOR STRUCTURES OF CLINICIANS' PERSONALITY RATINGS,
AD-609 549 DIV. 28

•KAPLAN, K. R.
• • •
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 705 DIV. 8
• • •
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 745 DIV. 8

•KAPLOW, ROY
• • •
DETERMINATION OF X-RAY SCATTERING FACTORS WITH LIQUID SPECIMENS.
AD-609 603 DIV. 20

•KARJALA, D. S.
• • •
ON ANALYTIC CONTINUATION OF A CLOSED REGION SOLUTION TO AN OPEN REGION.
AD-609 857 DIV. 8

•KASHYAP, R. L.
• • •
AN EXPONENTIALLY CONVERGENT AND FINITE ALGORITHM FOR LINEAR INEQUALITIES,
AD-609 777 DIV. 15

•KASKEY, GILBERT
• • •
MULTI-LIST SYSTEM: ADDITIONAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 709 DIV. 32
• • •
MULTI-LIST SYSTEM: FINAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 710 DIV. 32

•KAUFMAN, LOUIS G. , II.
• • •
PRESSURE MEASUREMENTS FOR MACH 8 FLOWS OVER EXPANSION CORNERS AND RAMPS ON AN IN TERNALLY COOLED MODEL. PART II. FLOWS OVER A FLAT PLATE WITH AND WITHOUT A PARTIAL SPAN RAMP. PART OF AN INVESTI GATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACT FRISTICS.
AD-609 958 DIV. 9

•KAUFMANN, LOUIS G. , II.
• • •
PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR MACH 21 FLOWS OVER A BLUNT PYRAMIDAL CONFIGU RATION WITH AERODYNAMIC CONTROLS. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS
AD-609 959 DIV. 9

•KAY, EMANUEL
• • •
THE EFFECTS OF GOAL DIFFICULTY ON PERFORMANCE: A FIELD EXPER IMENT,
AD-609 508 DIV. 28

•KEESEE, THOMAS H.
• • •
MODELING CRITERIA AND TESTING TECHNIQUES FOR THE SIMULATION OF SPACE ENVIRONMENTS.
AD-609 858 DIV. 12

•KEIM, ROBERT
• • •
THE ATTRIBUTE DERIVATION AND DISPLAY SYSTEM FOR THE EXPERIMENTAL DYNAMIC PROCESSOR.
AD-609 488 DIV. 30

•KELLEY, JOHN J. , JR.
• • •
RADIATIVE ENERGY EXCHANGE OVER ARCTIC LAND AND SEA, PART I. DATA, 1962.
AD-609 963 DIV. 2

•KELLY, LAWRENCE R.
• • •
MODELING CRITERIA AND TESTING TECHNIQUES FOR THE SIMULATION OF SPACE ENVIRONMENTS.
AD-609 858 DIV. 12

•KENDALL, P. J.
• • •
A METHOD FOR PREDICTING THERMAL RESPONSE IN SANDWICH PANELS.
AD-609 506 DIV. 19

•KENNARD, E. H.
• • •
FORCED VIBRATION OF BEAMS AND FLUTTER OF BEAM-FOIL SYSTEMS
AD-609 499 DIV. 9

•KEYS, R. D.
• • •
CRYOGENIC MATERIALS DATA HANDBOOK,
AD-609 562 DIV. 25

•KHOMYAKOV, K. B.
• • •
INFLUENCE OF ALLOYING ON THE HARDNESS OF NIAI AND ITS SOLID SOLUTIONS,
AD-609 783 DIV. 17

•KIEFER, T. F.
• • •
CRYOGENIC MATERIALS DATA HANDBOOK,
AD-609 562 DIV. 25

•KIES, J. A.
• • •
A NAVY ANALYSIS OF GLASS REINFORCED PLASTICS FOR HYDROSPACE APPLICATIONS,
AD-609 708 DIV. 14

•KISLYAKOV, V. S.
• • •
LONGITUDINAL STABILITY OF AN AIRPLANE WITH DELAYED ACTION AUTOPILOT,
AD-609 781 DIV. 1

•KLEE, VICTOR
• • •
PATHS IN POLYHEDRA.
II,
AD-609 498 DIV. 15
• • •
PATHS IN POLYHEDRA. I
AD-609 971 DIV. 15
• • •
A CLASS OF LINEAR PROGRAMMING PROBLEMS REQUIRING A LARGE NUMBER OF ITERATIONS,
AD-609 986 DIV. 15

•KLEIN, MORTON
• • •
MARKOVIAN DECISION MODELS FOR REJECT ALLOWANCE PROBLEMS.
AD-609 677 DIV. 26

•KORNFIELD, ALFRED T.
• • •
BIOSENSING TECHNICS FOR HUMAN DETECTION. I. THE FROG SKIN TRANSDUCER: PRELIMINARY EXPERIMENT.
AD-609 936 DIV. 6

•KOVALEVSKAYA, E. M.
• • •
CALCULATION OF MAXIMUM APPLICABLE FREQUENCIES FOR COMMUNICATION BETWEEN TWO POINTS BY A DIGITAL COMPUTER
AD-609 799 DIV. 8

•KOZLOV, L. V.
• • •
CONNECTION OF AERODYNAMIC HEAT WITH SKIN FRICTION,
AD-609 788 DIV. 9

•KRAUSS, MAX
• • •
BIOSENSING TECHNICS FOR HUMAN DETECTION. I. THE FROG SKIN TRANSDUCER: PRELIMINARY EXPERIMENT.
AD-609 936 DIV. 6

•KRIEGER, F. J.
• • •
THE THERMODYNAMICS OF THE POLYAMIDE RESIN (NYLON-6): CARBON-HYDROGEN-OXYGEN NITROGEN VAPOR SYSTEM.
AD-609 882 DIV. 19

•KRISHNAIAH, P. R.
• • •
TABLES FOR THE STUDENTIZED LARGEST CHI-SQUARE DISTRIBUTION AND THEIR APPLICATIONS,
AD-609 988 DIV. 19
• • •
SIMULTANEOUS TESTS FOR TREND AND SERIAL CORRELATIONS FOR GAUSSIAN MARKOV RESIDUALS
AD-609 659 DIV. 19

•KROHN, KENNETH B.
• • •
ALGEBRAIC THEORY OF MACHINES. I. THE MAIN DECOMPOSITION THEOREM. PRIME DECOMPOSITION THEOREM FOR FINITE SEMIGROUPS.
AD-609 981 DIV. 30

•KUCHERENKO, L. A.
• • •
INFLUENCE OF ALLOYING ON THE HARDNESS OF NIAl AND ITS SOLID SOLUTIONS,
AD-609 783 DIV. 17

•KUHNLE, P. I.
• • •
EXPERIMENTAL RESEARCH INVESTIGATION OF EXTREMELY LOW FREQUENCY PROPAGATION.
AD-609 719 DIV. 8

•KULA, ERIC B.
• • •
THE EFFECT OF SPECIMEN GEOMETRY ON DETERMINATION OF ELONGATION IN SHEET TENSILE SPECIMENS.
AD-609 689 DIV. 17

•KURNIT, A. A.
• • •
THEORY OF ERROR OF THE RUNGE-KUTTA METHOD,
AD-609 656 DIV. 19

•LAFFERTY, EDWARD L.
• • •
THE ROLE OF SIMULATION AND DATA REDUCTION PROGRAMS IN THE DEVELOPMENT OF REAL-TIME SYSTEMS.
AD-609 500 DIV. 30

•LANDSBERG, H. I.
• • •
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES.
AD-609 809 DIV. 3
• • •
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES, VOLUME I.
AD-609 805 DIV. 3

•LARIVIERE, P. D.
• • •
THE DESIGN AND PERFORMANCE OF A FALLOUTTESTED MANNED SHELTER STATION AND ITS SUITABILITY AS A SINGLE-FAMILY SHELTER
AD-609 729 DIV. 18

•LAVIK, MELVIN
• • •
THE STRUCTURE AND STRENGTH OF EPITAXIAL FILMS.
AD-609 730 DIV. 29

•LAVINE, M. C.
• • •
METALLURGICAL ASPECTS OF GAAS-GE HETEROJUNCTIONS.
AD-609 611 DIV. 17

•LAVYGIN, I. A.
• • •
ABOUT REACTIONS OF 8-OXYQUINOLINE TRIBUTOXY TITANIUM WITH D, W-DIHYDROXY-POLYDIMETHYL SILOXANE,
AD-609 787 DIV. 4

•LAWTON, JOHN G.
• • •
INVESTIGATIONS OF ADAPTIVE DETECTION TECHNIQUES.
AD-609 799 DIV. 8

•LEE, H.
• • •
THE DESIGN AND PERFORMANCE OF A FALLOUTTESTED MANNED SHELTER STATION AND ITS SUITABILITY AS A SINGLE-FAMILY SHELTER
AD-609 729 DIV. 18

•LEGTERS, LYMAN H.
• • •
U. S. ARMY AREA HANDBOOK FOR COLOMBIA.
AD-609 556 DIV. 32

•LEHMANN, SHIRLEY J.
• • •
U. S. ARMY AREA HANDBOOK FOR BRAZIL,
AD-609 983 DIV. 18

•LEIBOWITZ, H. A.
• • •
BASIC APPLIED RESEARCH IN FLUID POWER CONTROL.
AD-609 652 DIV. 12

•LEIBOWITZ, RALPH C.
• • •
FORCED VIBRATION OF BEAMS AND FLUTTER OF BEAM-FOIL SYSTEMS
AD-609 499 DIV. 9

•LELEVIER, R. E.
• • •
CHANGES IN THE CHEMICAL COMPOSITION OF THE ATMOSPHERE FOLLOWING INTENSE IONIZATION IMPULSES.
AD-609 792 DIV. 2

•LEOPOLD, HOWARD S.
• • •
INITIATION OF EXPLOSIVES BY EXPLODING WIRES. V. EFFECT OF WIRE MATERIAL ON THE INITIATION OF PETN BY EXPLODING WIRES
AD-609 949 DIV. 22

•LEPOY, GEORGE V.
• • •
THE CONSEQUENCES OF INGESTION BY MAN OF REAL AND SIMULATED FALLOUT,
AD-609 624 DIV. 16

•LEVENETZ, B.
• • •
OPTIMUM FILAMENT DIAMETER.
AD-609 695 DIV. 31

•LEVIN, E.
• • •
RESEARCH AND DEVELOPMENT ON PHOTOCONDUCTIVE PHOTO-TAPE.
AD-609 768 DIV. 29

•LEVINE, MARVIN
• • •
TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY AND LEARNING.
AD-609 811 DIV. 28

•LEVIS, A. H.
• • •
BASIC APPLIED RESEARCH IN FLUID POWER CONTROL.
AD-609 652 DIV. 12

•LEVY, C.
• • •
CHEMICAL-ELECTRICAL SENSING.
AD-609 721 DIV. 4

•LEVY, CHARLES
• • •
THE ELECTRODEPOSITION OF CHROMIUM ALLOYS. A LITERATURE REVIEW.
AD-609 691 DIV. 26

•LEVY, R. H.
• • •
THE DIOCOTRON INSTABILITY IN A CYLINDRICAL GEOMETRY
AD-609 638 DIV. 8

•LEVY, S. Y.
• • •
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 705 DIV. 8

•LIEBOW, ELLIOT
• • •
U. S. ARMY AREA HANDBOOK FOR JAPAN,
AD-609 551 DIV. 32

•LIESKE, BRUCE J.
• • •
RADIATIVE ENERGY EXCHANGE OVER ARCTIC LAND AND SEA, PART I, DATA, 1962.
AD-609 583 DIV. 2

•LIFSHITZ, J. M.
• • •
MULTIPLE INTEGRAL REPRESE NTATION OF MECHANICAL BEHAVIOR OF POLYETHYLENE.
AD-609 657 DIV. 19

•LINDNER, WILLIAM
• • •
LATERALIZATION OF SOUNDS AT THE UNSTIMULATED EAR OPPOSITE TO A NOISE-ADAPTED EAR.
AD-609 956 DIV. 28

•LIPPMANN, D. Z.
• • •
PROPERTIES OF BUOYANT MATERIALS AND STRUCTURES.
AD-609 821 DIV. 19

•LIPSKY, GEORGE A.
• • •
U. S. ARMY AREA HANDBOOK FOR ETHIOPIA.
AD-609 549 DIV. 32
• • •
U. S. ARMY AREA HANDBOOK FOR COLOMBIA.
AD-609 556 DIV. 32

•LISS, D.
• • •
THE MINIMUM NUMBER OF LINEAR DECISION FUNCTIONS TO IMPLEMENT A DECISION PROCESS
AD-609 976 DIV. 15

•LIUZZI, LEONARD
• • •
A STUDY OF THE EFFECT OF SOLIDIFICATION IMPERFECTIONS ON THE TENSILE PROPERTIES OF CAST STEEL.
AD-609 951 DIV. 17

•LOURIA, MARGOT
• • •
HISTORICAL INCIDENTS OF EXTREME OVERCROWDING.
AD-609 752 DIV. 32

•LOWAN, ARNOLD N.
• • •
ON STABILITY CRITERIA OF EXPLICIT DIFFERENCE SCHEMES FOR CERTAIN HEAT CONDUCTION PROBLEMS WITH UNCOMMON BOUNDARY CONDITIONS.
AD-609 738 DIV. 25

•LUST, H. J.
• • •
LOCAL BOUNDARY LAYER APPROXIMATIONS OF REGULAR FLOWS PAST A SEMI-INFINITE PLATE,
AD-609 599 DIV. 9

•LUTZ, ROBERT R.
• • •
RESEARCH AND DEVELOPMENT OF MATERIALS FOR GUNS AT WATERTOWN ARSENAL LABORATORIES. IMPACT PROPERTIES OF STEEL MICROSTRUCTURES.
AD-609 672 DIV. 22

•LYMAN, ELISABETH R.
• • •
A DESCRIPTIVE LIST OF PLATO LESSON PROGRAMS, 1960-1964,
AD-609 699 DIV. 23

•MACARTHUR, ARCHIBALD G.
• • •
U. S. ARMY AREA HANDBOOK FOR THE REPUBLIC OF THE SUDAN.
AD-609 550 DIV. 32

•MACGAFFEY, WYATT
• • •
U. S. ARMY AREA HANDBOOK FOR THE REPUBLIC OF THE SUDAN.
AD-609 550 DIV. 32

•MADAY, BELA C.
• • •
U. S. ARMY AREA HANDBOOK FOR BRAZIL,
AD-609 483 DIV. 18

• • •
U. S. ARMY AREA HANDBOOK FOR ETHIOPIA.
AD-609 549 DIV. 32

• • •
U. S. ARMY AREA HANDBOOK FOR COLOMBIA.
AD-609 556 DIV. 32

•MAEDER, PAUL F.
• • •
A. C. SOLENOID OF FINITE LENGTH IN A CONDUCTING MEDIUM WITH HALL CONDUCTIVITY,
AD-609 462 DIV. 25

•MAGRAB, E. B.
• • •
STRESS ANALYSIS OF A CYLINDER PRESSURELOADED OVER EQUAL AND OPPOSITE ARCS.
AD-609 640 DIV. 25

•MANKOWICH, A.
• • •
THE ENERGETICS OF MICELLAR SOLUBILIZATION, AN ACTION OF THE DETERGENCY MECHANISM.
AD-609 665 DIV. 19

•MARLOW, J. C.
• • •
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME I. SYSTEM DESCRIPTION AND ANALYSIS.
AD-609 750 DIV. 12

•MARTIN, J. A.
• • •
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
AD-609 437 DIV. 14

• • •
DESIGN APPROACHES FOR SATELLITE ANTENNAS.
AD-609 616 DIV. 8

•MARTIN, J. B.
• • •
EXTENDED DISPLACEMENT BOUND THEOREMS FOR WORK HARDENING CONTINUA SUBJECTED TO IMPULSIVE LOADING.
AD-609 760 DIV. 25

•MARTIN, T. P.
• • •
INFRARED COATING STUDIES.
AD-609 779 DIV. 19

•MARTORELL, LUZ E.
• • •
U. S. ARMY AREA HANDBOOK FOR BRAZIL,
AD-609 483 DIV. 18

•MASCH, FRANK D.
• • •
SEPARATION IN A NON-UNIFORM SHEAR FLOW,
AD-609 778 DIV. 9

•MASCIANICA, FRANCIS S.
• • •
BALLISTIC CONCEPTS EMPLOYED IN TESTING LIGHTWEIGHT ARMOR.
AD-609 690 DIV. 22

•MASSELL, BENTON F.
• • •
AFRICAN STUDIES AND ECONOMIC ANALYSIS,
AD-609 680 DIV. 32

•MASTERS, J. I.
• • •
THE INVESTIGATION OF PASSIVE LASER QSWITCHING.
AD-609 643 DIV. 25

•MATHEWSON, ALICE W.
• • •
PREPARATION DATA FOR COMPUTATION OF VERTICAL FLEXURAL MODES OF HULL VIBRATION BY DIGITAL PROCESS,
AD-609 630 DIV. 31

•MATISTIC, A. S.
• • •
PEM QUARTZ CRYSTAL UNITS, FILTER LOW FREQUENCY, 1MC TO 10MC TYPES CR-(XM-49)/U THRU CR-(XM-52)/U.
AD-609 463 DIV. 8

•MATSUURA, E.
• • •
ON THE STEADY STATE OF IONIZATION IN WEAKLY IONIZED PLASMA IN THE NON-EQUILIBRIUM STATE,
AD-609 439 DIV. 25

•MCCABE, JOHN P.
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME I. SIMULATION OF 473L SYSTEM OVER A RANGE OF OPERATING CONDITIONS.
AD-609 763 DIV. 18

• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME II. SIMCON AND SIMSCRIPT SIUMLATION TECHNIQUES: A COMPARISON.
AD-609 764 DIV. 18

• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME III. ANALYSIS OF SERIAL AND PARALLEL FILE STRUCTURES.
AD-609 765 DIV. 18

•MCCARTER, PATRICIA
• • •
MULTI-LIST SYSTEM: ADDITIONAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 709 DIV. 32

•MCCOOL, J. I.
• • •
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
AD-609 437 DIV. 14

•MCFLENEY, PATRICK C.
• • •
ELECTROMAGNETIC TEST CONTROL REQUIREMENTS,
AD-609 438 DIV. 30

•MCFWEN, JEAN
• • •
U. S. ARMY AREA HANDBOOK FOR THE REPUBLIC OF THE SUDAN.
AD-609 550 DIV. 32

•MCMULLEN, ROBERT W.
• • •
CALCULATION OF EFFICIENCIES OF AEROSOL GENERATING DEVICES FROM FLUX MEASUREMENTS OBTAINED IN FIELD TRIALS,
AD-609 840 DIV. 3

•MCRAE, I.
• • •
DESIGN AND DEVELOPMENT OF MECHANICAL MODULAR PROGRAMMER.
AD-609 737 DIV. 22

•MEGAREL, L. R.
• • •
MODIFICATIONS MADE TO THE USAF TRANSPORTABLE PASSIVE SATELLITE COMMUNICATIONS TERMINAL.
AD-609 809 DIV. 8

•MERZ, K. H.
• • •
PRECISION VOLUME RESISTOR.
AD-609 623 DIV. 8

•MEYER, J. R.
• • •
A FIRST APPROXIMATION TO A RAND MODEL FOR STUDY OF URBAN TRANSPORTATION,
AD-609 771 DIV. 33

•MEYERHOFFER, D.
• • •
COMPATIBLE ACTIVE THIN-FILM INTEGRATED STRUCTURES.
AD-609 461 DIV. 8

•MILLER, DAVID B.
• • •
SPACE PROPULSION BY PLASMA ACCELERATION TECHNIQUES.
AD-609 833 DIV. 27

• • •
INDUCTIVE PLASMA HEATING USING A MULTITURN COIL.
AD-609 834 DIV. 25

•MILLER, FORREST
• • •
MULTI-LIST SYSTEM: FINAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 710 DIV. 32

•MILLER, I. C.
• • •
MULTIPLE TAPPED PHOTOELASTIC DELAY LINE.
AD-609 579 DIV. 25

•MILLER, J. T. , JR.
• • •
STUDIES OF LOW-TEMPERATURE OXIDATION REACTIONS.
AD-609 800 DIV. 4

•MINORSKY, N.
• • •
INTRODUCTION TO NON-LINEAR MECHANICS. PART IV. RELAXATION OSCILLATIONS,
AD-609 701 DIV. 25

•MITCHELL, F. H.
• • •
BASIC APPLIED RESEARCH IN FLUID POWER CONTROL.
AD-609 652 DIV. 12

•MITCHELL, L. H.
• • •
BASIC APPLIED RESEARCH IN FLUID POWER CONTROL.
AD-609 652 DIV. 12

•MITTRA, R.
• • •
ON ANALYTIC CONTINUATION OF A CLOSED REGION SOLUTION TO AN OPEN REGION.
AD-609 857 DIV. 8

•MJOLSNESS, R. C.
• • •
DISTORTED WAVE CALCULATION OF ROTATIONAL EXCITATION OF N2 BY SLOW ELECTRONS.
AD-609 837 DIV. 25

•MOORE, E. W.
• • •
EVALUATION OF THE MULTIPLE ARRAY PROCESSOR IN DETECTING P-WAVE MOTION AT THE T.F.S.O.
AD-609 533 DIV. 2
• • •
EFFECT OF CHANGING MULTIPLE ARRAY PROCESSOR OUTPUT FILTER BAND WIDTH.
AD-609 536 DIV. 2

•MOORE, T. H.
• • •
RESEARCH AND DEVELOPMENT ON PHOTOCONDUCTIVE PHOTO-TAPE.
AD-609 768 DIV. 29

•MORDUCHOW, MORRIS
• • •
REVIEW OF THEORETICAL INVESTIGATIONS ON THE EFFECT OF HEAT TRANSFER ON LAMINAR SEPARATION,
AD-609 575 DIV. 9

•MORGAN, J. P.
• • •
A METHOD FOR PREDICTING THERMAL RESPONSE IN SANDWICH PANELS.
AD-609 506 DIV. 13

•MORGAN, L. A.
• • •
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME I. SYSTEM DESCRIPTION AND ANALYSIS.
AD-609 750 DIV. 12

•MORGAN, ROSS L.
• • •
TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY AND LEARNING.
AD-609 811 DIV. 28

•MORITZ, HELMUT
• • •
THE BOUNDARY VALUE PROBLEM OF PHYSICAL GEODESY.
AD-609 455 DIV. 2

•MORSE, ROBERT W.
• • •
ONR POLICY ON RESEARCH
AD-609 646 DIV. 30

•MOULIN, L.
• • •
OPTIMIZATION OF RECOVERY TRAJECTORIES FOR SPACE VEHICLES.
AD-609 573 DIV. 12

•MOW, C. C.
• • •
TRANSIENT RESPONSE OF A RIGID SPHERICAL INCLUSION IN AN ELASTIC MEDIUM,
AD-609 850 DIV. 25

•MROCZKOWSKI, R. S.
• • •
METALLURGICAL ASPECTS OF GAAS-GE HETEROJUNCTIONS.
AD-609 611 DIV. 17

•MUELLER, C. W.
• • •
COMPATIBLE ACTIVE THIN-FILM INTEGRATED STRUCTURES.
AD-609 461 DIV. 8

•MUHLENBERG, FREDERICA
• • •
U. S. ARMY AREA HANDBOOK FOR JAPAN,
AD-609 551 DIV. 32

•MUKHERJEE, NALIN R.
• • •
STUDIES TO DETERMINE THE MECHANISM OF PRODUCTION AND REMOVAL OF ELECTRONS IN FLAMES.
AD-609 515 DIV. 10

•MULLER, ERWIN W.
• • •
FIELD ION MICROSCOPY OF IRON WHISKERS.
AD-609 859 DIV. 17

•MULLER, GEORGE M.
• • •
THE STUDY OF THE ORIGIN AND PROPAGATION OF DISTURBANCES IN THE BURNING OF SOLID PROPEL LANTS.
AD-609 886 DIV. 10
• • •
THE STUDY OF THE ORIGIN AND PROPAGATION OF DISTURBANCES IN THE BURNING OF SOLID PROPEL LANTS.
AD-609 887 DIV. 10

•MUNDT, DON F.
• • •
MULTI-LIST SYSTEM: ADDITIONAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 709 DIV. 32
• • •
MULTI-LIST SYSTEM: FINAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 710 DIV. 32

•MURRAY, E. M. E.
• • •
THE INVESTIGATION OF PASSIVE LASER QSWITCHING.
AD-609 693 DIV. 25

•MURRAY, P. C.
• • •
RESEARCH AND DEVELOPMENT ON PHOTOCONDUCTIVE PHOTO-TAPE.
AD-609 768 DIV. 29

•MURTAGH, THOMAS BLACKHALL
• • •
FIRST ORDER OBLATENESS PERTURBATIONS AND THE U. S. NAVAL SPACE SURVEILLANCE SYSTEM.
AD-609 566 DIV. 6

•MURTHY, V. K.
• • •
SIMULTANEOUS TESTS FOR TREND AND SERIAL CORRELATIONS FOR GAUSSIAN MARKOV RESIDUALS
AD-609 654 DIV. 15

•NASH, G.
• • •
CRACK INITIATION IN METALLIC MATERIALS.
AD-609 739 DIV. 17

•NEIGHBOURS, JOHN R.
• • •
TABLE OF THE DEBYE FUNCTIONS
AD-609 702 DIV. 25

•NELSON, PAUL D.
• • •
PERSONAL HISTORY CORRELATES OF MILITARY PERFORMANCE AT A LARGE ANTARCTIC STATION
AD-609 542 DIV. 28
• • •
STRUCTURAL CHANGE IN SMALL ISOLATED GROUPS,
AD-609 543 DIV. 28
• • •
COMPATIBILITY AMONG WORK ASSOCIATES IN ISOLATED GROUPS
AD-609 544 DIV. 28

•NEVANS, ESSIE S.
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME I. SIMULATION OF 473L SYSTEM OVER A RANGE OF OPERATING CONDITIONS.
AD-609 763 DIV. 18
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME II. SIMCOM AND SIMSCRIPT SIUMLATION TECHNIQUES: A COMPARISON.
AD-609 764 DIV. 18
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME III. ANALYSIS OF SERIAL AND PARALLEL FILE STRUCTURES.
AD-609 765 DIV. 18

•NEVITT, T. D.
• • •
THE RADIATION CHEMISTRY OF ACETYLENIC COMPOUNDS.
AD-609 440 DIV. 4

•NICHOLS, R. H.
• • •
PRODUCTION ENGINEERING MEASURE FOR METERS, TAUT-BAND SUSPENSION, A-C MOVING IRON VANE PER SIGNAL CORPS REQUIREMENTS SCS-160.
AD-609 510 DIV. 7

•NICHOLS, T. R.
• • •
INFLUENCE OF PRESSURE ON SLUDGING OF P-C-437 STEAM CLEANERS,
AD-609 662 DIV. 29

•NICOLET, MARCEL
• • •
IONOSPHERIC PROCESSES AND NITRIC OXIDE.
AD-609 849 DIV. 2

•NIEHAUS, FRANK A.
• • •
THE DEVELOPMENT AND EVALUATION OF POLYSTYRENE FOAM CONTAINER FOR MK 66 TYPE SUBMARINE SIGNALS
AD-609 647 DIV. 26

•NIELSEN, ELWIN
• • •
IDENTIFYING RESEARCH CHARACTERISTICS IN HIGH SCHOOL STUDENTS, A SECOND STUDY,
AD-609 485 DIV. 23

•NISHIKAWA, USAMU
• • •
FIELD ION MICROSCOPY OF IRON WHISKERS.
AD-609 859 DIV. 17

•NISSLEY, P. M.
• • •
STRUCTURAL DESIGN FOR FUEL CONTAINMENT UNDER SURVIVABLE CRASH CONDITIONS.
AD-609 615 DIV. 1

•NOYES, A. E.
• • •
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME I. SYSTEM DESCRIPTION AND ANALYSIS.
AD-609 750 DIV. 12

•OAKES, P. N.
• • •
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
AD-609 843 DIV. 8

•ORNE, MARTIN T.
• • •
PSYCHOLOGICAL CORRELATES OF PLATEAU HYPNOTIZABILITY IN A SPECIAL VOLUNTEER SAMPLE.
AD-609 713 DIV. 28

•ORVICK, JAMES M.
• • •
PERSONAL HISTORY CORRELATES OF MILITARY PERFORMANCE AT A LARGE ANTARCTIC STATION
AD-609 542 DIV. 28

•OSGOOD, S. M.
• • •
CRYOGENIC MATERIALS DATA HANDBOOK,
AD-609 562 DIV. 29

•O'CONNELL, DONALD N.
• • •
PSYCHOLOGICAL CORRELATES OF PLATEAU HYPNOTIZABILITY IN A SPECIAL VOLUNTEER SAMPLE.
AD-609 713 DIV. 28

•O'NEAL, H. A.
• • •
MANIPULATORS AND SPECIAL DEVICES,
AD-609 490 DIV. 2

•PAKURAR, THOMAS A.
• • •
MEASUREMENT AND PREDICTION OF DIFFUSIVITIES TO 1700K IN BINARY SYSTEMS CONTAINING CARBON DIOXIDE.
AD-609 597 DIV. 25

•PALMER, E. P.
• • •
CRATERING PRODUCED IN METALS BY HIGHVELOCITY IMPACT
AD-609 641 DIV. 22

•PARINI, V. P.
• • •
ELECTROPHYSICAL PROPERTIES OF CERTAIN AROMATIC BETAINES
AD-609 789 DIV. 25

•PARKE, N. G.
• • •
TOROIDAL WAVE FUNCTIONS AND THEIR APPLICATION TO THE FREE-FLOODING RING TRANSDUCER.
AD-609 529 DIV. 25

•PARTS, L.
• • •
STUDIES OF LOW-TEMPERATURE OXIDATION REACTIONS.
AD-609 808 DIV. 4

•PAUKER, EWA T.
• • •
GANEFO I: SPORTS AND POLITICS IN DJAKARTA,
AD-609 659 DIV. 32

•PENFOLD, A. S.
• • •
RESEARCH ON ELECTROMAGNETIC PLASMA ACCELERATION.
AD-609 482 DIV. 25

•PERKEL, DONALD H.
• • •
APPLICATIONS OF A DIGITAL-COMPUTER SIMULATION OF A NEURAL NETWORK,
AD-609 681 DIV. 30

•PETERS, E. T.
• • •
MECHANICAL BEHAVIOR OF INTERMETALLIC COMPOUNDS.
AD-609 706 DIV. 17

•PFEFFER, I.
• • •
ERROR ANALYSIS CONSIDERATIONS FOR A SATELLITE RENDEZVOUS
AD-609 484 DIV. 12

•PFENDER, E.
• • •
THERMAL CHARACTERISTICS OF A HIGH AND LOW MASS FLUX ARGON PLASMA JET.
AD-609 622 DIV. 25

•PFISTER, W.
• • •
ROCKET MEASUREMENTS WITH ELECTRON AND ION PROBES IN AN AURORA.
AD-609 454 DIV. 2

•PIERCE, CYRIL M.
• • •
COMPUTER ANALYSIS OF THE HEAT FLOW IN THE VACUUM ARC MELTING OF MOLYBDENUM
AD-609 651 DIV. 17

•PIERCE, JEAN
• • •
LATERALIZATION OF SOUNDS AT THE UNSTIMULATED EAR OPPOSITE TO A NOISE-ADAPTED EAR.
AD-609 456 DIV. 28

•PITTS, DAVID EUGENE
• • •
DIURNAL AND SEMIDIURNAL VARIATIONS OF ISOPYCNIC SURFACES UP TO THE MESOPAUSE AS INFERRED BY THE WIND FIELD.
AD-609 723 DIV. 2

•PLATAU, GERHARDT
• • •
ELECTRONICALLY FUNCTIONAL ORGANIC MATERIALS.
AD-609 831 DIV. 25

•PODOLSKY, BORIS
• • •
A FUNDAMENTAL THEORETICAL AND EXPERIMENTAL STUDY OF ROTARY MAGNETOHYDRODYNAMICS
AD-609 812 DIV. 25

•POLITIS, D. T.
• • •
THE RADAR CROSS SECTION OF AN IONIZED WAKE OF A HYPERSONIC BODY,
AD-609 512 DIV. 6

•POND, J. I.
• • •
THE DESIGN AND PERFORMANCE OF A FALLOUTTESTED MANNED SHELTER STATION AND ITS SUITABILITY AS A SINGLE-FAMILY SHELTER
AD-609 734 DIV. 18

•POPE, D.
• • •
THE TRW TWO-STATION, ON-LINE SCIENTIFIC COMPUTER.
AD-609 720 DIV. 30

•PORCH, HARRIETT
• • •
ECONOMICS DEPARTMENT PUBLICATIONS, 1959-1964: AN AUTHOR INDEX OF THE OPEN LITERATURE, WITH ABSTRACTS.
AD-609 873 DIV. 32

•POULOS, N. E.
• • •
SLIP-CAST FUSED SILICA
AD-609 667 DIV. 12

•PRILEPIN, M. I.
• • •
METHOD OF MEASURING DISTANCE
AD-609 789 DIV. 2

•PUMMER, WALTER J.
• • •
FLUOROCARBON POLYMERS. PERFLUOROPOLYTOLYLENES,
AD-609 448 DIV. 4

•RACKETS, H. M.
• • •
AUTOMATED BULLETIN AND SEISMIC DATA RETRIEVAL SYSTEM.
AD-609 528 DIV. 2

•RAGAZZINI, J. R.
• • •
RESEARCH INVESTIGATIONS IN SYSTEMS THEORY.
AD-609 450 DIV. 30

•RAKOWSKA-HARMSTONE, TERESA
• • •
U. S. ARMY AREA HANDBOOK FOR JAPAN,
AD-609 551 DIV. 32

•RAMSEY, BARBARA A.
• • •
A COLLATION STUDY OF A HIGHLY MAGNETIC PERIOD (SEPTEMBER 20-23, 1963).
AD-609 862 DIV. 2

•RAPPAPORT, B.
• • •
PRODUCTION ENGINEERING MEASURE, TRANSISTOR, VHF, SILICON, POWER (5W-70MC).
AD-609 741 DIV. 8

•RASHIP, MANUSH
• • •
ON THE REALIZATION OF BINARY SWITCHING FUNCTIONS WITH MAJORITY GATES,
AD-609 504 DIV. 7
• • •
AN ALGEBRAIC-GEOMETRIC TECHNIQUE FOR THE REALIZATION OF SWITCHING FUNCTIONS WITH M-OUTOF-N DECISION GATES,
AD-609 505 DIV. 7

•RATE, EDWARD T.
• • •
PRODUCTION ENGINEERING MEASURE ON HIGH PERVEANCE CATHODE-RAY TUBES.
AD-609 563 DIV. 8

•RAVNER, H.
• • •
THE STABILIZATION OF MONOETHANOLAMINE SOLUTIONS FOR SUBMARINE CARBON DIOXIDE SCRUBBERS.
AD-609 888 DIV. 31

•READ, LESLIE W.
• • •
LOW-NOISE L-BAND AMPLIFIER.
AD-609 494 DIV. 8

•REE, TAIKYUE
• • •
STUDIES TO DETERMINE THE MECHANISM OF PRODUCTION AND REMOVAL OF ELECTRONS IN FLAMES.
AD-609 515 DIV. 10

•RENNER, HAROLD C.
• • •
SOLID STATE TACAN.
AD-609 810 DIV. 19

•REPPERT, M. N.
• • •
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES 2N599-2N1094.
AD-609 492 DIV. 8
• • •
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES, 2N560, 2N1051, 2N1072, 2N1195, 1N664, 1N665, 1N666, 1N667, 1N668, 1N669, 1N673, 1N675, 1N697 AND 1N701.
AD-609 522 DIV. 8

•REUTHER, THEODORE C., JR.
• • •
DIFFUSION IN COLUMBIUM RICH COLUMBIUMTITANIUM ALLOYS WITH CONSIDERATION OF THE POSSIBILITY THAT THE DIFFUSION COEFFICIENT IS TIME DEPENDENT.
AD-609 870 DIV. 17

•REVESZ, A. G.
• • •
COMPATIBLE ACTIVE THIN-FILM INTEGRATED STRUCTURES.
AD-609 461 DIV. 8

•REYNOLDS, JAMES H.
• • •
AN EVALUATION OF MULTIPLE TRACKS IN A LINEAR PROGRAM.
AD-609 801 DIV. 23
• • •
LEARNING SET FORMATION IN PROGRAMMED INSTRUCTION.
AD-609 802 DIV. 23

•RHODES, JOHN L.
• • •
ALGEBRAIC THEORY OF MACHINES. I. THE MAIN DECOMPOSITION THEOREM. PRIME DECOMPOSITION THEOREM FOR FINITE SEMIGROUPS.
AD-609 581 DIV. 30

•RHOTEN, MERLE L.
• • •
RESEARCH ON RADIOGRAPHIC TECHNIQUES OF GRAPHITE EVALUATION.
AD-609 877 DIV. 30

•RICARD, PAUL C.
• • •
PEN FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200C.
AD-609 639 DIV. 8

•RICHARDS, PAUL B.
• • •
RESEARCH IN THE RESTRICTED PROBLEMS OF THREE AND FOUR BODIES.
AD-609 613 DIV. 2

•RICHARDSON, H.H.
• • •
BASIC APPLIED RESEARCH IN FLUID POWER CONTROL.
AD-609 652 DIV. 12

•RINTZ, FRANCES CHADWICK
• • •
U. S. ARMY AREA HANDBOOK FOR JAPAN,
AD-609 551 DIV. 32

•RIZZITANO, F. J.
• • •
DEVELOPMENT OF A STRUCTURAL URANIUM ALLOY,
AD-609 594 DIV. 17

•ROBINSON, J. P.
• • •
ERROR CONTROL THROUGH CODING. VOLUME II. RECURRENT BURST-ERROR-CORRECTING CODES.
AD-609 467 DIV. 8

•ROBINSON, P. H.
• • •
COMPATIBLE ACTIVE THIN-FILM INTEGRATED STRUCTURES.
AD-609 461 DIV. 8

•RORSON, D. S.
• • •
NOTE ON REPEATED SELECTION IN THE NORMAL CASE.
AD-609 464 DIV. 32
• • •
ON THE PROBABILITY DISTRIBUTION OF X MODULO N.
AD-609 465 DIV. 32

•RODGERS, E.
• • •
QUALITY CONTROL BY NONDESTRUCTIVE TESTING METHODS.
AD-609 694 DIV. 26

•ROGERS, C. W. C.
• • •
PRACTICAL INTERPRETATION OF METEOROLOGICAL SATELLITE DATA.
AD-609 493 DIV. 2

•ROGOWSKI, RICHARD R.
• • •
PROJECT BEARS (BACTERIOLOGICAL EFFECTS, AIRCRAFT REFUELING SYSTEMS).
AD-609 527 DIV. 10

•ROLLINS, ORVILLE
• • •
CHEMISTRY PROGRAM REVIEW, FISCAL YEAR 1964,
AD-609 879 DIV. 4

•RONDEAU, R. E.
• • •
THE RADIATION CHEMISTRY OF ACETYLENIC COMPOUNDS.
AD-609 440 DIV. 4

•ROSEN, R. M.
• • •
RESEARCH ON ELECTROMAGNETIC PLASMA ACCELERATION.
AD-609 482 DIV. 25

•ROSEN, STANLEY B.
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME I. SIMULATION OF 473L SYSTEM OVER A RANGE OF OPERATING CONDITIONS.
AD-609 763 DIV. 18
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME II. SIMCOM AND SIMSCRIPT SIMULATION TECHNIQUES; A COMPARISON.
AD-609 764 DIV. 18
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME III. ANALYSIS OF SERIAL AND PARALLEL FILE STRUCTURES.
AD-609 765 DIV. 18

•ROSENBERG, BENJAMIN
• • •
THE USE OF DOUBLY REFRACTING SOLUTIONS IN THE INVESTIGATION OF FLUID FLOW PHENOMENA,
AD-609 632 DIV. 9

•ROSENBERG, HAROLD
• • •
TOPICS IN ANALYSIS. THEORETICAL MATHEMATICS.
AD-609 619 DIV. 15

•ROSENHECK, ALLAN J.
• • •
PERSONNEL COMMUNICATIONS IN SPACE. A STUDY OF SPEECH TRANSMISSION AND HELMET COMFORT.
AD-609 609 DIV. 29

•ROSENTHAL, SOL ROY
• • •
INJURY OF THE SKIN.
AD-609 860 DIV. 14

•RUBINSHTEIN, A. M.
• • •
ELECTRIC AND MAGNETIC PROPERTIES OF THERMALLY TREATED FERROCENE BASE POLYMERS,
AD-609 782 DIV. 4

•RUDLINGER, GEORGE
• • •
DYNAMICS OF GAS-PARTICLE MIXTURES WITH FINITE PARTICLE VOLUME.
AD-609 598 DIV. 9

•RUSSELL, H. W.
• • •
EFFECTS OF THUNDERSTORMS ON TFSO OPERATIONS, 1964.
AD-609 537 DIV. 2

•RUSSELL, LAWRENCEH.
• • •
RESEARCH IN THE RESTRICTED PROBLEMS OF THREE AND FOUR BODIES.
AD-609 613 DIV. 2

•RUST, C. E.
• • •
CERAMICS: THEIR ROLE IN WEAPONRY.
AD-609 696 DIV. 14

•RUST, JOHN H.
• • •
THE CONSEQUENCES OF INGESTION BY MAN OF REAL AND SIMULATED FALLOUT,
AD-609 624 DIV. 16

•RYAN, J. J.
• • •
MECHANICAL BEHAVIOR OF INTERMETALLIC COMPOUNDS.
AD-609 706 DIV. 17

•SAMPSON, D. H.
• • •
DISTORTED WAVE CALCULATION OF ROTATIONAL EXCITATION OF N2 BY SLOW ELECTRONS.
AD-609 837 DIV. 25
• • •
CHOICE OF AN APPROPRIATE MEAN ABSORPTION COEFFICIENT FOR USE IN THE GENERAL GREY GAS EQUATIONS.
AD-609 838 DIV. 25

•SANBORN, R.
• • •
ATOMIC OSCILLATOR DEVICE FOR NAVIGATIONGUIDANCE.
AD-609 776 DIV. 8

•SANTOMIERI, J.
• • •
THERMAL EMISSION OF NEUTRAL CESIUM.
AD-609 584 DIV. 25

•SAPARINA, E.
• • •
THE ELECTRONIC INTERLOCUTOR -AND THE MACHINE SAID IN RESPONSE
AD-609 784 DIV. 30

•SARTOR, J. D.
• • •
THE DESIGN AND PERFORMANCE OF A FALLOUTTESTED MANNED SHELTER STATION AND ITS SUITABILITY AS A SINGLE-FAMILY SHELTER
AD-609 729 DIV. 18

•SATO, ROBERT N.
• • •
DYNAMIC MEASUREMENTS OF PROTECTIVE MASKS.
AD-609 582 DIV. 3

•SATTEN, ROBERT A.
• • •
RARE EARTH IONS IN CRYSTALLINE FIELDS.
AD-609 541 DIV. 20

•SCANLON, JANE CRONIN
• • •
RESEARCH IN THE RESTRICTED PROBLEMS OF THREE AND FOUR BODIES.
AD-609 613 DIV. 2

•SCHAFFER, H. E.
• • •
ON THE PROBABILITY DISTRIBUTION OF X MODULO N.
AD-609 465 DIV. 32

•SCHAFFER, R.
• • •
THE RADIATION CHEMISTRY OF ACETYLENIC COMPOUNDS.
AD-609 440 DIV. 4

•SCHERER, ERNST F.
• • •
SOLID-STATE GENERATOR.
AD-609 679 DIV. 8

•SCHMALL, ROBERT A.
• • •
DESIGN AND OPERATION OF A SPACE RENDEZVOUS SIMULATOR.
AD-609 748 DIV. 12

•SCHMIDT, W. E.
• • •
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
AD-609 437 DIV. 14

•SCHRODER, K.
• • •
CRACK INITIATION IN METALLIC MATERIALS.
AD-609 739 DIV. 17

•SCHULTZ, F. V.
• • •
THE BORN APPROXIMATION APPLIED TO ELECTROMAGNETIC SCATTERING FROM A FINITE CONE.
AD-609 724 DIV. 25

•SCHWARTZ, A. J.
• • •
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
AD-609 437 DIV. 14

•SCHWARTZBERG, F. R.
• • •
CRYOGENIC MATERIALS DATA HANDBOOK,
AD-609 562 DIV. 25

•SCHWEPPE, F. C.
• • •
ALGORITHMS FOR ESTIMATING A RE-ENTRY BODY'S POSITION, VELOCITY AND BALLISTIC COEFFICIENT IN REAL TIME OR FOR POST FLIGHT ANALYSIS.
AD-609 524 DIV. 12

•SCHWIDERSKI, E. W.
• • •
LOCAL BOUNDARY LAYER APPROXIMATIONS OF REGULAR FLOWS PAST A SEMI-INFINITE PLATE,
AD-609 599 DIV. 9

•SEAMAN, L.
• • •
STRESS PROPAGATION IN SOILS.
AD-609 555 DIV. 2

•SEARS, PAUL H.
• • •
NOTES ON THE BEGINNINGS OF MODERN METEORITICS,
AD-609 879 DIV. 2

•SECKELMANN, ROBERT
• • •
INVESTIGATION OF FERRITE PHASE SHIFTERS AT C-AND X-BAND.
AD-609 813 DIV. 8

•SEGRE, JOSEPH
• • •
THERMOELECTRIC POWER OF THE TRANSITION METAL DIBORIDES.
AD-609 816 DIV. 25

•SEIFERT, HOWARD S.
• • •
THE EFFECT OF PROPELLANT ENERGY AND MASS DISTRIBUTION ON ROCKET PROPULSION EFFICIENCY.
AD-609 513 DIV. 27

•SELAMOGLU, SUHA
• • •
A. C. SOLENOID OF FINITE LENGTH IN A CONDUCTING MEDIUM WITH HALL CONDUCTIVITY,
AD-609 462 DIV. 25

•SELLS, S. B.
• • •
DIMENSIONS OF STIMULUS SITUATIONS WHICH ACCOUNT FOR BEHAVIOR VARIANCE.
AD-609 735 DIV. 28

•SEMCHYSHEN, M.
• • •
STUDIES OF REFRACTORY ALLOY SHEET MATERIALS.
AD-609 815 DIV. 17

•SENDERS, JOHN W.
• • •
TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY AND LEARNING.
AD-609 811 DIV. 28

•SERPAN, C. Z. , JR.
• • •
YANKEE REACTOR PRESSURE VESSEL SURVEILLANCE: EVALUATION OF SPECIMENS EXPOSED DURING THE SECOND CORE,
AD-609 969 DIV. 20

•SFORZA, PASQUALE M.
• • •
LINEARIZED ANALYSIS OF UNSTEADY, REACTING FLOWS WITH BODY FORCES,
AD-609 974 DIV. 9

•SHAPLEY, LLOYD S.
• • •
VALUES OF LARGE GAMES- VII: A GENERAL EXCHANGE ECONOMY WITH MONEY,
AD-609 648 DIV. 32

•SHARONOV, V. V.
• • •
PETROGRAPHIC INVESTIGATION OF THE LUNAR SURFACE BY JOINT USE OF PHOTOMETRIC AND COLORIMETRIC OBSERVATIONS,
AD-609 693 DIV. 2

•SHARP, D. W. A.
• • •
FINAL REPORT THE REACTIONS OF INORGANIC COMPOUNDS IN NON-AQUEOUS SOLVENTS .
AD-609 712 DIV. 9

•SHAVER, C. J.
• • •
RESEARCH DEVELOPMENT AND TEST OF REFRACTORY METAL ALLOY FASTENERS.
AD-609 653 DIV. 26

•SHEARER, JAMES W.
• • •
STUDY OF TRAINING PERFORMANCE EVALUATION TECHNIQUES.
AD-609 605 DIV. 23

•SHERIDAN, THOMAS B.
• • •
HUMAN USE OF SHORT TERM MEMORY IN PROCESSING INFORMATION ON A CONSOLE,
AD-609 749 DIV. 30

•SHERMAN, CHARLES H.
• • •
TOROIDAL WAVE FUNCTIONS AND THEIR APPLICATION TO THE FREE-FLOODING RING TRANSDUCER.
AD-609 929 DIV. 25

•SHERMAN, MARTIN P.
• • •
ANALYTICAL-EXPERIMENTAL CORRELATION OF RADIATION LOSS FROM AN ARGON ARCJET.
AD-609 722 DIV. 25

•SHERR, PAUL E.
• • •
PRACTICAL INTERPRETATION OF METEOROLOGICAL SATELLITE DATA.
AD-609 493 DIV. 2

•SHIH, CHI-KAI
• • •
INFRARED SPECTRA OF METAP HOSPHATE GLASSES.
AD-609 606 DIV. 19

•SHIH, KWANG-TIEN
• • •
THERMODYNAMIC PROPERTIES OF CARBONNITROGEN MIXTURES AT HIGH TEMPERATURES.
AD-609 670 DIV. 25

•SHOR, RONALD E.
• • •
PSYCHOLOGICAL CORRELATES OF PLATEAU HYPNOTIZABILITY IN A SPECIAL VOLUNTEER SAMPLE.
AD-609 713 DIV. 28

•SHTRIKMAN, S.
• • •
A PROBABILITY DENSITY COMMON TO MOLECULAR FIELD AND COLLECTIVE EXCITATION THEORIES OF FERROMAGNETISM.
AD-609 592 DIV. 25

•SIBBETT, D. J.
• • •
RATE OF SUBLIMATION OF AMMONIUM HALIDES,
AD-609 814 DIV. 9

•SIEKMANN, J.
• • •
RESPONSE OF A THIN SHELL TO A SHOCK WAVE.
AD-609 869 DIV. 22

•SILVERMAN, HERBERT M.
• • •
A COLLATION STUDY OF A HIGHLY MAGNETIC PERIOD (SEPTEMBER 20-23, 1963).
AD-609 862 DIV. 2

•SIMMS, R. J.
• • •
LONG WAVELENGTH INFRARED FIBER OPTICS.
AD-609 842 DIV. 19

•SIMONOV, A. M.
• • •
FLECTROPHYSICAL PROPERTIES OF CERTAIN AROMATIC BETAINES
AD-609 785 DIV. 25

•SINTON, WILLIAM M.
• • •
PHYSICAL RESEARCHES ON THE BRIGHTER PLANETS.
AD-609 547 DIV. 2

•SLINKIN, A. A.
• • •
ELECTRIC AND MAGNETIC PROPERTIES OF THERMALLY TREATED FERROCENE BASE POLYMERS,
AD-609 782 DIV. 9

•SMITH, A. W. H.
• • •
PRODUCTION ENGINEERING MEASURE FOR IMPROVED RELIABILITY OF SOLID ELECTROLYTE TANTALUM CAPACITORS.
AD-609 707 DIV. 8

•SMITH, R. D.
• • •
EXPERIMENTAL RESEARCH INVESTIGATION OF EXTREMELY LOW FREQUENCY PROPAGATION.
AD-609 719 DIV. 8

•SMITH, R. L.
• • •
ATOMIC OSCILLATOR DEVICE FOR NAVIGATIONGUIDANCE.
AD-609 776 DIV. 8

•SMITH, RAPHAEL F.
• • •
QUANTITATIVE INTERPRETATION OF THE EXERCISE ELECTROCARDIOGRAM. USE OF COMPUTER TECHNIQUES IN THE CARDIAC EVALUATION OF AVIATION PERSONNEL.
AD-609 944 DIV. 16

•SMITH, S. H. , JR.
• • •
MODIFICATION OF THE RINGROSE CARBON DIOXIDE METER,
AD-609 881 DIV. 31

•SNOW, GARY SPENCER
• • •
DIELECTRIC LOSS IN MGO AND SAPPHIRE.
AD-609 617 DIV. 25

•SOUTHWELL, C. R.
• • •
CORROSION OF METALS IN TROPICAL ENVIRONMENTS. PART 6. ALUMINUM AND MAGNESIUM.
AD-609 618 DIV. 17

•SPOKES, G. NEIL
• • •
THE ROLE OF ALUMINUM AND ITS OXIDES IN SOLID PROPEL LANTS.
AD-609 991 DIV. 10

•SPRINKEL, MILTON D.
• • •
CHEMISTRY PROGRAM REVIEW, FISCAL YEAR 1964,
AD-609 879 DIV. 9

•SPURRIER, WILMA A.
• • •
INJURY OF THE SKIN.
AD-609 860 DIV. 16

•SRINIVASAN, C. V.
• • •
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 749 DIV. 8

•SRINIVASAN, C. V.
• • •
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 709 DIV. 8

•STABLEIN, PAUL
• • •
THE STRUCTURE AND STRENGTH OF EPITAXIAL FILMS.
AD-609 730 DIV. 25

•STACEY, J.
• • •
FLECTRONICS RESEARCH PROGRAM. RESEARCH AND EXPERIM ENTATION ON SPACE APPLICATIONS OF MILLIMETER WAVES.
AD-609 594 DIV. 8

•STEADMAN, R. MAX
• • •
SOLID STATE TACAN.
AD-609 810 DIV. 19

•STEDRY, ANDREW C.
• • •
THE EFFECTS OF GOAL DIFFICULTY ON PERFORMANCE: A FIELD EXPER IMENT,
AD-609 508 DIV. 28

•STEELE, L. E.
• • •
YANKEE REACTOR PRESSURE VESSEL SURVEILLANCE: EVALUATION OF SPECIMENS EXPOSED DURING THE SECOND CORE,
AD-609 969 DIV. 20

•STEIGER, MARTIN H.
• • •
FURTHER SIMILARITY SOLUTIONS OF WAKES AND JETS. PART I. TWO-DIMENSIONAL FLOWS. PART II. AXISYMMETRIC FLOWS,
AD-609 976 DIV. 9

•STEVENS, J. W.
• • •
ORBITAL FLIGHT AND COVERAGE SIMULATION,
AD-609 502 DIV. 12

•STICKLEY, C. MARTIN
• • •
APPLICATIONS OF LASERS.
AD-609 896 DIV. 25

•STOLTENBERG, H. P.
• • •
PROPERTIES OF BUOYANT MATERIALS AND STRUCTURES.
AD-609 821 DIV. 19

•STOLUROW, LAWRENCE M.
• • •
A MODEL AND CYBERNETIC SYSTEM FOR RESEARCH ON THE TEACHING-LEARNING PROCESS.
AD-609 940 DIV. 23

•STONE, F. E.
• • •
STUDY OF RESIDUAL STRESSES IN THICK GLASS FILAMENT REINFORCED LAMINATES.
AD-609 610 DIV. 14

•STOTTS, JOHNNIE M.
• • •
AN/FPA-22(XW-1), AN/FPA-23(XW-1), L/UHF-BAND PENCIL BEAM RADARS.
AD-609 633 DIV. 6

•STRAUB, H. H.
• • •
HUMAN BREATHING PARAMETERS AND COMMERCIAL AUTOMATIC RESPIRATORS,
AD-609 732 DIV. 16

•STRAUSS, ROBERT F.
• • •
MONITORING OF ROCKET ENGINE PERFORMANCE BY SPECTROSCOPIC TECHNIQUES.
AD-609 492 DIV. 27

•STRONG, S. L.
• • •
DETERMINATION OF X-RAY SCATTERING FACTORS WITH LIQUID SPECIMENS.
AD-609 603 DIV. 20

•SU, GOUQ-JEN
• • •
INFRARED SPECTRA OF METAP HOSPHATE GLASSES.
AD-609 606 DIV. 14

•SUTHERLAND, J. E.
• • •
RATE OF SUBLIMATION OF AMMONIUM HALIDES,
AD-609 814 DIV. 4

•SWEETLAND, ANDERS
• • •
ASSESSING THE IMPACT OF WEAPON SYSTEM MODIFICATIONS BY FIELD STUDY: A FEASIBILITY DEMONSTRATION.
AD-609 791 DIV. 18

•SYMONS, M. C. R.
• • •
THE EFFECT OF ADDED ELECT ROLYTES ON THE E. S. R. AND OPTICAL ABSORPTION OF METAL AMMONIA SOLUTIONS.
AD-609 957 DIV. 4

•TANG, D. T.
• • •
ERROR CONTROL THROUGH CODING. VOLUME III. VARIABLE REDUNDANCY CODES.
AD-609 470 DIV. 8

•TANNER, L. E.
• • •
MECHANICAL BEHAVIOR OF INTERMETALLIC COMPOUNDS.
AD-609 706 DIV. 17

•TASHA, HERMAN J.
• • •
EROSION OF THE CLIFFS OF OUTER CAPE COD: TABLES AND GRAPHS,
AD-609 839 DIV. 2

•TAYLOR, CALVIN W.
• • •
IDENTIFYING RESEARCH CHARACTERISTICS IN HIGH SCHOOL STUDENTS, A SECOND STUDY,
AD-609 485 DIV. 23
• • •
INFORMATION AND SCIENTIFIC CREATIVITY,
AD-609 486 DIV. 28

•TAYLOR, V. W.
• • •
INVESTIGATION OF SYSTEM RESPONSE AS A FUNCTION OF AZIMUTH FROM TONTO FOREST SEISMOLOGICAL OBSERVATORY.
AD-609 532 DIV. 2

•THOMPSON, G.
• • •
HUMAN BREATHING PARAMETERS AND COMMERCIAL AUTOMATIC RESPIRATORS,
AD-609 732 DIV. 16

•TIKHOMIROV, I. I.
• • •
CERTAIN PHYSIOLOGICAL SHIFTS IN THE HUMAN ORGANISM DURING ACCLIMATIZATION IN THE INTRACONTINENTAL REGIONS OF ANTARCTICA,
AD-609 790 DIV. 16

•TOBOLSKY, A. V.
• • •
STUDIES IN IONIC COPOLYME RIZATION.
AD-609 697 DIV. 4

•TOMAN, KURT
• • •
A STUDY OF A SCINTILLATION MECHANISM.
AD-609 848 DIV. 29

•TRIBBY, D. E.
• • •
PRODUCTION ENGINEERING MEASURE. YIG SPHERES AND LIMITERS.
AD-609 661 DIV. 8

•TROSHKINA, V. A.
• • •
INFLUENCE OF ALLOYING ON THE HARDNESS OF NIAI AND ITS SOLID SOLUTIONS,
AD-609 783 DIV. 17

•TRUE, ROBERT H.
• • •
EFFECT OF MAGNETIC FIELDS ON MICROWAVE GAS-DISCHARGE DUPLEXER CHARACTERISTICS,
AD-609 698 DIV. 8

•TSAO, CARSON K. H.
• • •
INVESTIGATIONS OF ELECTRICAL CHARACTERISTICS OF THE SUBSURFACE ROCK MEDIUM IN ESSEX COUNTY, NEW YORK.
AD-609 683 DIV. 2
• • •
CONDUCTIVITY MEASUREMENTS IN DISSIPATIVE MEDIA WITH ELECTRICALLY SHORT PROBES.
AD-609 684 DIV. 2

•TURNER, A. F.
• • •
INFRARED COATING STUDIES.
AD-609 779 DIV. 14

•TUTTLE, THOMAS R., JR.
• • •
ON THE COMPOSITION OF DILUTE ALKALI METALAMMONIA SOLUTIONS.
AD-609 578 DIV. 4

•UEBERSCHAER, MANFRED H.
• • •
THE EFFECTS OF MISMATCH AND DISTORTION ON THE OUTPUT SIGNAL OF A LINEAR FM PULSE-COMPRESSION FILTER,
AD-609 478 DIV. 8

•ULWICK, J. C.
• • •
ROCKET MEASUREMENTS WITH ELECTRON AND ION PROBES IN AN AURORA.
AD-609 454 DIV. 2

•VAN DE MARK, D. K.
• • •
RATE OF SUBLIMATION OF AMMONIUM HALIDES,
AD-609 814 DIV. 4

•VAN TREES, H. L.
• • •
OPTIMUM SIGNAL DESIGN AND PROCESSING FOR REVERBERATION, LIMITED ENVIRONMENTS.
AD-609 589 DIV. 6

•VANNICOLA, VINCENT C.
• • •
FAST HIGH POWER MICROWAVE SWITCHES. A SURVEY,
AD-609 655 DIV. 8

•VICARS, E. C.
• • •
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 867 DIV. 26
• • •
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 868 DIV. 26
• • •
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 871 DIV. 26

•VICK, N. G.
• • •
THE MARINE ICHTHYOFAUNA OF ST. ANDREW BAY, FLORIDA, AND NEARSHORE HABITATS OF THE NORTHEASTERN GULF OF MEXICO
AD-609 715 DIV. 2

•VIEZEE, WILLIAM
• • •
ANALYSIS OF DAYTIME RADIATION DATA FROM TIROS IV.
AD-609 767 DIV. 2

•VILKS, I.
• • •
MECHANICAL BEHAVIOR OF INTERMETALLIC COMPOUNDS.
AD-609 706 DIV. 17

•VILLENEUVE, A. T.
• • •
STUDY OF ADVANCED ANTENNA SYSTEMS PROBLEMS FOR SPACE VEHICLES.
AD-609 703 DIV. 6

•W, J. DUBOIS,
• • •
MOMENTS OF INERTIA AND CENTERS OF GRAVITY OF THE LIVING HUMAN BODY ENCUMBERED BY A FULL-PRESSURE SUIT.
AD-609 863 DIV. 16

•WAGNER, RICHARD C.
• • •
PRODUCTION ENGINEERING MEASURES FOR HIGH RELIABILITY, FIXED, FILM, PRECISION RESISTORS.
AD-609 602 DIV. 8

•WAINWRIGHT, JOHN B.
• • •
MODELING CRITERIA AND TESTING TECHNIQUES FOR THE SIMULATION OF SPACE ENVIRONMENTS.
AD-609 858 DIV. 12

•WALDEN, RICHARD
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME I. SIMULATION OF 473L SYSTEM OVER A RANGE OF OPERATING CONDITIONS.
AD-609 763 DIV. 18
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME II. SIMCOM AND SIMSCRIPT SIUMLATION TECHNIQUES: A COMPARISON.
AD-609 764 DIV. 18
• • •
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME III. ANALYSIS OF SERIAL AND PARALLEL FILE STRUCTURES.
AD-609 765 DIV. 18

•WALL, LEO A.
• • •
FLUOROCARBON POLYMERS. PERFLUOROPOLYTOLYLENES,
AD-609 448 DIV. 4

•WALLACE, DONALD A.
• • •
MODELING CRITERIA AND TESTING TECHNIQUES FOR THE SIMULATION OF SPACE ENVIRONMENTS.
AD-609 858 DIV. 12

•WALTON, J. D.
• • •
SLIP-CAST FUSED SILICA
AD-609 667 DIV. 12

•WAMBOLD, J. N.
• • •
PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
AD-609 686 DIV. 8

•WATSON, H. E.
• • •
YANKEE REACTOR PRESSURE VESSEL SURVEILLANCE: EVALUATION OF SPECIMENS EXPOSED DURING THE SECOND CORE,
AD-609 569 DIV. 20

•WATTENBURG, W. H.
• • •
TECHNIQUES FOR AUTOMATING THE CONSTRUCTION OF TRANSLATORS FOR PROGRAMMING LANGUAGES
AD-609 487 DIV. 30

•WEISS, R.
• • •
THE NEAR WAKE OF A WEDGE
AD-609 577 DIV. 9

•WEISS, V.
• • •
CRACK INITIATION IN METALLIC MATERIALS.
AD-609 739 DIV. 17

•WEISSLER, ALFRED
• • •
CHEMISTRY PROGRAM REVIEW, FISCAL YEAR 1964,
AD-609 875 DIV. 4

•WENGER, WAYNE R.
• • •
ELECTRONICALLY FUNCTIONAL ORGANIC MATERIALS.
AD-609 831 DIV. 25

•WHEELER, A.
• • •
RATE OF SUBLIMATION OF AMMONIUM HALIDES,
AD-609 814 DIV. 4

•WHERRY, ROBERT J. , JR.
• • •
AN INVESTIGATION OF UNPREDICTED DIFFERENCES IN ATTRITION RATES AMONG STUDENTS FROM DIFFERENT PROCUREMENT SOURCES.
AD-609 668 DIV. 23

•WHISENHUNT, F. S. , JR.
• • •
FILAMENT-WINDING PLASTICS. PART 2. ROLE OF THE RESIN IN GLASS-FIBER-REINFORCED STRUCTURES UNDER TENSILE STRESS
AD-609 770 DIV. 14

•WHITMAN, A. M.
• • •
AN UNCOOLED, RAPID RESPONSE PROBE FOR MEASURING STAGNATION PRESSURES IN HIGH VELOCITY ARC PLASMA.
AD-609 621 DIV. 25

•WHITMAN, R. V.
• • •
STRESS PROPAGATION IN SOILS.
AD-609 555 DIV. 2

•WIDGER, WILLIAM K. , JR.
• • •
PRACTICAL INTERPRETATION OF METEOROLOGICAL SATELLITE DATA.
AD-609 493 DIV. 2

•WIDREWITZ, JULIUS
• • •
CONCEPTS RELATIVE TO SYSTEM EFFECTIVENESS,
AD-609 637 DIV. 30

•WILKIE, L. E.
• • •
ORBITAL FLIGHT AND COVERAGE SIMULATION,
AD-609 502 DIV. 12

•WILLIAMS, JOHN R.
• • •
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND TO INSURE THE RELIABILITY OF THE C600 SERIES FIELD EFFECT TRANSISTORS.
AD-609 596 DIV. 8

•WILLIAMSON, GUY G.
• • •
AN EXPERIMENTAL STUDY OF TURBULENCE IN A DRIVEN VORTEX,
AD-609 460 DIV. 9

•WINDER, R. O.
• • •
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 709 DIV. 8
• • •
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 745 DIV. 8

•WINTER, EDGAR R. F.
• • •
THERMODYNAMIC PROPERTIES OF CARBONNITROGEN MIXTURES AT HIGH TEMPERATURES.
AD-609 670 DIV. 25

•WINTZER, W. F.
• • •
DEEXCITATION OF HELIUM ATOMS IN THE METASTABLE TRIPLET STATE (2-3S) IN PURE HELIUM.
AD-609 832 DIV. 6

•WISOWATY, MARILYN
• • •
THE ATTRIBUTE DERIVATION AND DISPLAY SYSTEM FOR THE EXPERIMENTAL DYNAMIC PROCESSOR.
AD-609 488 DIV. 30

•WITTMANN, THOMAS J.
• • •
DESIGN AND OPERATION OF A SPACE RENDEZVOUS SIMULATOR.
AD-609 748 DIV. 12

•WOLF, CHARLES , JR.
• • •
NATIONAL PRIORITIES AND DEVELOPMENT STRATEGIES IN SOUTHEAST ASIA,
AD-609 660 DIV. 32

•WOLF, J. K.
• • •
RESEARCH INVESTIGATIONS IN SYSTEMS THEORY.
AD-609 450 DIV. 30

•WONG, EUGENE
• • •
ON THE RELATION BETWEEN ORDINARY AND STOCHASTIC DIFFERENTIAL EQUATIONS,
AD-609 826 DIV. 19

•WOODWARD, R. H.
• • •
ATOMIC OSCILLATOR DEVICE FOR NAVIGATIONGUIDANCE.
AD-609 776 DIV. 8

•WUNDERLICH, BERNHARD
• • •
COMPARISON OF EXTENDED POLYETHYLENE AND CHRYSOTILE ASBESTOS FRACTURE SURFACES.
AD-609 608 DIV. 14

•WYATT, J. L.
• • •
INDUCTIVE PLASMA ACCELERATION RESEARCH.
AD-609 728 DIV. 27

•WYNER, A. D.
• • •
ERROR CONTROL THROUGH CODING. VOLUME II. RECURRENT BURST-ERROR-CORRECTING CODES.
AD-609 467 DIV. 8

•ZAKAI, MOSHE
• • •
ON THE RELATION BETWEEN ORDINARY AND STOCHASTIC DIFFERENTIAL EQUATIONS,
AD-609 926 DIV. 19

•ZEIGLER, BERNARD P.
• • •
HUMAN USE OF SHORT TERM MEMORY IN PROCESSING INFORMATION ON A CONSOLE,
AD-609 749 DIV. 30

•ZEIGLER, JOHN M.
• • •
EROSION OF THE CLIFFS OF OUTER CAPE COD: TABLES AND GRAPHS,
AD-609 839 DIV. 2

•ZESEWITZ, JOHN G.
• • •
USAEL PRIMARY FREQUENCY STANDARDS.
AD-609 795 DIV. 8

•ZWICK, CHARLES J.
• • •
MODELS OF URBAN CHANGE: THEIR ROLE IN URBAN TRANSPORTATION RESEARCH,
AD-609 755 DIV. 33

CORPORATE AUTHOR - MONITORING AGENCY INDEX

•ADVANCED RESEARCH PROJECTS AGENCY WASHINGTON D C
• • •
VUF1013
ANALYSIS OF SHOAL DATA ON GROUND MOTION AND CONTAINMENT SAFETY PROGRAM.
AD-609 874 DIV. 20

•AEROCHEM RESEARCH LABS INC PRINCETON N J
• • •
AEROCHEM TN 43
ACOUSTIC WAVE-BURNING ZONE INTERACTION IN SOLID PROPELLANTS.
AD-609 817 DIV. 10
• • •
AEROCHEM TP 49
ACOUSTIC WAVE-BURNING ZONE INTERACTION IN SOLID PROPELLANTS.
AD-609 818 DIV. 10

•AEROELASTIC AND STRUCTURES RESEARCH LAB MASS INST OF TECH CAMBRIDGE
• • •
ASRL TR 119 1
STUDIES ON THE INSTABILITY OF CIRCULAR RINGS.
(AFOSR 64 1843)
AD-609 503 DIV. 13
• • •
ASRL 106 2
A LAGRANGIAN FINITE DIFFERENCE METHOD FOR TWO-DIMENSIONAL MOTION INCLUDING MATERIAL STRENGTH.
(WL TR64 107)
AD-609 523 DIV. 25

•AEROJET-GENERAL CORP AZUSA CALIF
• • •
AGC TN 43
RATE OF SUBLIMATION OF AMMONIUM HALIDES.
(AFOSR 9750)
AD-609 814 DIV. 4

•AEROJET-GENERAL CORP SACRAMENTO CALIF
• • •
AGC 7439 Q 1
HYDROSTATIC BEARING FEASI BILITY PROGRAM.
AD-609 628 DIV. 27

•AEROJET-GENERAL NUCLEONICS SAN RAMOS CALIF
• • •
AN 1238
INDUCTIVE PLASMA ACCELERATION RESEARCH.
(APL TDR64 97)
AD-609 728 DIV. 27

•AERONAUTICAL RESEARCH ASSOCIATES OF PRINCETON INC N J
• • •
ARAP TN 64 2
AN EXPERIMENTAL STUDY OF TURBULENCE IN A DRIVEN VORTEX.
(AFOSR 64 1929)
AD-609 460 DIV. 9

•AERONAUTICAL SYSTEMS DIV AIR FORCE SYSTEMS COMMAND WRIGHT-PATTERSON AFB OHIO
• • •
TDR62 1087 P3
MECHANICAL BEHAVIOR OF INTERMETALLIC COMPOUNDS.
AD-609 706 DIV. 17
• • •
TDR63 3061
A METHOD FOR PREDICTING THERMAL RESPONSE IN SANDWICH PANELS.
AD-609 506 DIV. 13

•AEROSPACE CORP LOS ANGELES CALIF
• • •
CSR 469(9990)PP 4
PROFESSIONAL PAPERS CLEARED FOR POSSIBLE PUBLICATION AND/OR PRESENTATION.
AD-609 569 DIV. 30
• • •
TDR 169(3250 91)TN 1
ELECTRONICS RESEARCH PROGRAM. RESEARCH AND EXPERIM ENTATION ON SPACE APPLICATIONS OF MILLIMETER WAVES.
(SSD TDR63 98)
AD-609 594 DIV. 8

•AEROSPACE MEDICAL RESEARCH LABS (6570TH) WRIGHTPATTERSON AFB OHIO
• • •
TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY AND LEARNING.
(AMRL TR64 104)
AD-609 811 DIV. 28

•AEROSPACE RESEARCH CENTER GENERAL PRECISION INC LITTLE FALLS N J
• • •
RESEARCH IN THE RESTRICTED PROBLEMS OF THREE AND FOUR BODIES.
(AFOSR 64 2492)
AD-609 613 DIV. 2

•AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO
• • •
64 132
ANALYTICAL-EXPERIMENTAL CORRELATION OF RADIATION LOSS FROM AN ARGON ARCJET.
AD-609 722 DIV. 25
• • •
64 138
A STUDY OF THE PLASMA BOUNDARY.
AD-609 567 DIV. 25
• • •
64 141
A STUDY OF THE SYNTHESIS AND PROPERTIES OF ALKAROMATIC CHLOROCARBONS.
AD-609 569 DIV. 4
• • •
64 149
THERMODYNAMIC PROPERTIES OF CARBONNITROGEN MIXTURES AT HIGH TEMPERATURES.
AD-609 670 DIV. 25
• • •
64 174
THE STRESSES IN A CYLINDRICAL SHELL CONTAINING AN AXIAL CRACK.
AD-609 669 DIV. 25
• • •
64 176
EXTENSION OF THE M2-AND THE THIN-WING EXPANSION METHODS TO MAGNETOHYDRODYNAMICS.
AD-609 568 DIV. 9
• • •
64 186
SIMULTANEOUS TESTS FOR TREND AND SERIAL CORRELATIONS FOR GAUSSIAN MARKOV RESIDUALS
AD-609 654 DIV. 15
• • •
64 187
BASIC EQUATIONS OF THE RELATIVISTIC TEST PARTICLE PROBLEM.
AD-609 590 DIV. 25
• • •
64 188
TABLES FOR THE STUDENTIZED LARGEST CHI-SQUARE DISTRIBUTION AND THEIR APPLICATIONS.
AD-609 588 DIV. 15
• • •
64 191
THERMAL CHARACTERISTICS OF A HIGH AND LOW MASS FLUX ARGON PLASMA JET.
AD-609 622 DIV. 25
• • •
64 192
AN UNCOOLED, RAPID RESPONSE PROBE FOR MEASURING STAGNATION PRESSURES IN HIGH VELOCITY ARC PLASMA.
AD-609 621 DIV. 25
• • •
64 1
REPORT ON RESEARCH, 1 JANUARY 1962-30 JUNE 1964
AD-609 797 DIV. 30

•AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C
• • •
FOREIGN SCIENCE BULLETIN, 1965, VOL. 1, NO. 1.
(TT 65 60477)
AD-609 980 DIV. 30
• • •
P64 661
SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS. PART A. BIOSCIENCES: COMPILATION OF ABSTRACTS.
(TT 65 60593)
AD-609 827 DIV. 16
• • •
U64 951
REFLECTIONS ON THE ROLE OF THE COMMANDER.
(TT 65 60556)
AD-609 644 DIV. 18

•AGRICULTURE RESEARCH SERVICE CORNELL UNIV ITHACA N Y
• • •
CU ARS IR 64 1
VERTICAL FLUXES WITHIN THE VEGETATIVE CANOPY OF A CORN FIELD, 1962.
AD-609 740 DIV. 2

•AIR FORCE AERO PROPULSION LAB AIR FORCE SYSTEMS COMMAND WRIGHT-PATTERSON AFB OHIO
• • •
TDR64 97
INDUCTIVE PLASMA ACCELERATION RESEARCH.
AD-609 728 DIV. 27
• • •
TR64 130
DESIGN AND OPERATION OF A SPACE RENDEZVOUS SIMULATOR.
AD-609 748 DIV. 12

•AIR FORCE AEROSPACE RESEARCH PILOT SCHOOL EDWARDS AFB CALIF
• • •
FTC TIH 64 2005
PERFORMANCE FLIGHT TESTING THEORY.
AD-609 489 DIV. 1

•AIR FORCE AVIONICS LAB RESEARCH AND TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
• • •
TDR64 175 SI
PERSONNEL COMMUNICATIONS IN SPACE. A STUDY OF SPEECH TRANSMISSION AND HELMET COMFORT.
AD-609 604 DIV. 29
• • •
TR64 264
A FIXED-VOLTAGE POWER SUPPLY FOR TRANSISTOR CIRCUITS.
AD-609 447 DIV. 8
• • •
TR64 270
RESEARCH ON MILLIMETER-WAVE GENERATION TECHNIQUES.
AD-609 625 DIV. 8
• • •
TR64 291
COMPATIBLE ACTIVE THIN-FILM INTEGRATED STRUCTURES.
AD-609 961 DIV. 8

•AIR FORCE BALLISTIC MISSILE DIV AIR RESEARCH AND DEVELOPMENT COMMAND INGLEWOOD CALIF
• • •
TN59 23
ON STABILITY CRITERIA OF EXPLICIT DIFFERENCE SCHEMES FOR CERTAIN HEAT CONDUCTION PROBLEMS WITH UNCOMMON BOUNDARY CONDITIONS.
AD-609 738 DIV. 25
• • •
TR59 21
CRATERING PRODUCED IN METALS BY HIGHVELOCITY IMPACT
AD-609 641 DIV. 22

•AIR FORCE CAMBRIDGE RESEARCH ABS BEDFORD MASS
• • •
ERP56
ROCKET MEASUREMENTS WITH ELECTRON AND ION PROBES IN AN AURORA.
AD-609 454 DIV. 2

•AIR FORCE CAMBRIDGE RESEARCH LABS BEDFORD MASS
• • •
ERP71
VERY LOW FREQUENCY ENVELOPE SPECTRA OF SOLAR RADIO BURSTS.
AD-609 861 DIV. 2
• • •
ERP72
A COLLATION STUDY OF

A HIGHLY MAGNETIC PERIOD (SEPTEMBER 20-23, 1963).
AD-609 862 DIV. 2

• • •

PMSRP64
A PROGRAM FOR THE SOLUTION OF A CLASS OF GEOMETRIC-ANALOGY INTELLIGENCE-TEST QUESTIONS.
AD-609 845 DIV. 30

• • •

PSRP65
DISPERSION ANALYSIS OF OPTICAL REFLECTIVITY.
AD-609 847 DIV. 25

• • •

PSRP66
AUTOIONIZATION SPECTRA OF GASES OBSERVED IN THE VACUUM ULTRAVIOLET.
AD-609 849 DIV. 25

• • •

PSRP71
A STUDY OF A SCINTILLATION MECHANISM.
AD-609 848 DIV. 25

• • •

SR15
APPLICATIONS OF LASERS.
AD-609 846 DIV. 25

• • •

64 1003
LASER ACTIVITIES AND BACKGROUND RADIATION STUDIES.
AD-609 759 DIV. 25

• • •

64 730
VERTICAL ELECTRIC DIPOLE IN A TWO CONDUCTOR REGION.
AD-609 685 DIV. 2

• • •

64 731
INVESTIGATIONS OF ELECTRICAL CHARACTERISTICS OF THE SUBSURFACE ROCK MEDIUM IN ESSEX COUNTY, NEW YORK.
AD-609 683 DIV. 2

• • •

64 762
THE BORN APPROXIMATION APPLIED TO ELECTROMAGNETIC SCATTERING FROM A FINITE CONE.
AD-609 724 DIV. 25

• • •

64 791;
ROCKET MEASUREMENTS WITH ELECTRON AND ION PROBES IN AN AURORA.
(AFCRL ERP56)
AD-609 454 DIV. 2

• • •

64 793
INVESTIGATION OF THE FUNDAMENTAL ELECTROCHEMICAL PARAMETERS INFLUENCING FUEL CELL PERFORMANCE.
AD-609 718 DIV. 7

• • •

64 807
PRACTICAL INTERPRETATION OF METEOROLOGICAL SATELLITE DATA.
AD-609 493 DIV. 2

• • •

64 833
THE BOUNDARY VALUE PROBLEM OF PHYSICAL GEODESY.
AD-609 455 DIV. 2

• • •

64 848
CONDUCTIVITY MEASUREMENTS IN DISSIPATIVE MEDIA WITH ELECTRICALLY SHORT PROBES.
AD-609 684 DIV. 2

• • •

64 856
HEAT TRANSPORT BY LARGE-SCALE ATMOSPHERIC WAVES DURING OCTOBER 1959-MARCH 1960.
AD-609 803 DIV. 2

• • •

64 884;
A PROGRAM FOR THE SOLUTION OF A CLASS OF GEOMETRIC-ANALOGY INTELLIGENCE-TEST QUESTIONS.
(AFCRL PMSRP64)
AD-609 845 DIV. 30

• • •

64 890
THE ATTRIBUTE DERIVATION AND DISPLAY SYSTEM FOR THE EXPERIMENTAL DYNAMIC PROCESSOR.
AD-609 488 DIV. 30

• • •

64 893
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 745 DIV. 8

• • •

64 894
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
AD-609 705 DIV. 8

• • •

64 902
INVESTIGATION OF SOLID STATE DEVICES AND CIRCUITS.
AD-609 674 DIV. 8

• • •

64 904
SOME RECENT ADVANCES IN MICROWAVE PHONON GENERATION AND DETECTION WITH APPLICATIONS TO THE STUDY OF PHONON-LATTICE INTERACTIONS IN DIELECTRIC MATERIALS.
AD-609 479 DIV. 25

• • •

64 905
ANALYSIS OF DAYTIME RADIATION DATA FROM TIROS IV.
AD-609 767 DIV. 2

• • •

64 911;
AUTOIONIZATION SPECTRA OF GASES OBSERVED IN THE VACUUM ULTRAVIOLET.
(AFCRL PSRP66)
AD-609 849 DIV. 25

• • •

64 912;
DISPERSION ANALYSIS OF OPTICAL REFLECTIVITY.
(AFCRL PSRP65)
AD-609 847 DIV. 25

• • •

64 914;
APPLICATIONS OF LASERS.
(AFCRL SR15)
AD-609 846 DIV. 25

• • •

64 926
PHYSICAL RESEARCHES ON THE BRIGHTER PLANETS.
AD-609 547 DIV. 2

• • •

64 941;
VERY LOW FREQUENCY ENVELOPE SPECTRA OF SOLAR RADIO BURSTS.
(AFCRL ERP71)
AD-609 861 DIV. 2

• • •

64 942;
A STUDY OF A SCINTILLATION MECHANISM.
(AFCRL PSRP71)
AD-609 848 DIV. 25

• • •

64 948
IONOSPHERIC PROCESSES AND NITRIC OXIDE.
AD-609 844 DIV. 2

• • •

64 950
STUDY OF ADVANCED ANTENNA SYSTEMS PROBLEMS FOR SPACE VEHICLES.
AD-609 703 DIV. 6

• • •

64 952
ON ANALYTIC CONTINUATION OF A CLOSED REGION SOLUTION TO AN OPEN REGION.
AD-609 857 DIV. 8

• • •

64 9791
A COLLATION STUDY OF A HIGHLY MAGNETIC PERIOD (SEPTEMBER 20-23, 1963).
(AFCRL ERP72)
AD-609 862 DIV. 2

•AIR FORCE FLIGHT DYNAMICS LAB RESEARCH AND TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

• • •

TDR64 113
RESEARCH DEVELOPMENT AND TEST OF REFRACTORY METAL ALLOY FASTENERS.
AD-609 653 DIV. 26

• • •

TDR64 120
PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR MACH 21 FLOWS OVER A BLUNT PYRAMIDAL CONFIGU RATION WITH AERODYNAMIC CONTROLS. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS
AD-609 559 DIV. 9

• • •

TDR64 127
BASIC APPLIED RESEARCH IN FLUID POWER CONTROL.
AD-609 652 DIV. 12

• • •

TR64 163
MONITORING OF ROCKET ENGINE PERFORMANCE BY SPECTROSCOPIC TECHNIQUES.
AD-609 492 DIV. 27

• • •

TR64 164
MODELING CRITERIA AND TESTING TECHNIQUES FOR THE SIMULATION OF SPACE ENVIRONMENTS.
AD-609 858 DIV. 12

•AIR FORCE MATERIALS LAB AIR FORCE SYSTEMS COMMAND WRIGHT-PATTERSON AFB OHIO

• • •

TDR64 195
SLIP-CAST FUSED SILICA
AD-609 667 DIV. 12

• • •

TDR64 277
RESEARCH ON RADIOGRAPHIC TECHNIQUES OF GRAPHITE EVALUATION.
AD-609 877 DIV. 30

• • •

TDR64 280
CRYOGENIC MATERIALS DATA HANDBOOK.
AD-609 562 DIV. 25

• • •

TR64 344
THE DETERMINATION OF CHLORINE AND IONIC CHLORIDE IN ORGANIC COMPOUNDS.
AD-609 680 DIV. 4

• • •

TR64 346
FIELD ION MICROSCOPY OF IRON WHISKERS.
AD-609 859 DIV. 17

• • •

TR64 353
THE RADIATION CHEMISTRY OF ACETYLENIC COMPOUNDS.
AD-609 440 DIV. 4

•AIR FORCE MATERIALS LAB AIR FORCE SYSTEMS COMMAND WRIGHT-PATTERSON AFB OHIO

• • •

TDR64 234
ELECTRICAL RESISTIVITY OF NIOBIUMZIRCONIUM ALLOYS BELOW 273.2K.
AD-609 798 DIV. 17

• • •

TDR64 308
COMPUTER ANALYSIS OF THE HEAT FLOW IN THE VACUUM ARC MELTING OF MOLYBDENUM
AD-609 651 DIV. 17

•AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C

• • •

TN60 1266;
AN IMBEDDING OF CLOSED RIEMANN SURFACES IN EUCLIDEAN SPACE.
AD-609 866 DIV. 15

• • •

4993
A STUDY OF THE DIFFUSIVITY OF IRON IN LIQUID SLAGS.
AD-609 459 DIV. 17

• • •

4871
STUDIES IN IONIC COPOLYME RIZATION.
AD-609 697 DIV. 4

• • •

64 1340
RESEARCH ON ELECTROMAGNETIC PLASMA ACCELERATION.
AD-609 482 DIV. 25

• • •

64 1658
REVIEW OF THEORETICAL INVESTIGATIONS ON THE EFFECT OF HEAT TRANSFER ON LAMINAR SEPARATION.
AD-609 575 DIV. 9

• • •

64 1715
STUDY OF DISLOCATION FAILURE PHENOMENA IN UNIFORM RADIAL AND TENSILE FIELDS
AD-609 859 DIV. 25

• • •

64 1843
STUDIES ON THE INSTABILITY OF CIRCULAR RINGS.
AD-609 503 DIV. 13

• • •

64 1872
CHEMISTRY PROGRAM REVIEW. FISCAL YEAR 1964.
AD-609 875 DIV. 4

• • •
64 1873
LINEARIZED ANALYSIS OF UNSTEADY, REACTING FLOWS WITH BODY FORCES,
AD-609 574 DIV. 9

• • •
64 1924
AN EXPERIMENTAL STUDY OF TURBULENCE IN A DRIVEN VORTEX,
AD-609 460 DIV. 9

• • •
64 1944
FURTHER SIMILARITY SOLUTIONS OF WAKES AND JETS. PART I. TWO-DIMENSIONAL FLOWS. PART II. AXISYMMETRIC FLOWS,
AD-609 576 DIV. 9

• • •
64 2028
A. C. SOLENOID OF FINITE LENGTH IN A CONDUCTING MEDIUM WITH HALL CONDUCTIVITY,
AD-609 462 DIV. 25

• • •
64 2074
AN ANALYSIS OF PERTURBED CONFOCAL RESONATORS.
AD-609 769 DIV. 25

• • •
64 2176
RESEARCH INVESTIGATIONS IN SYSTEMS THEORY.
AD-609 450 DIV. 30

• • •
64 2261
IDENTIFYING RESEARCH CHARACTERISTICS IN HIGH SCHOOL STUDENTS, A SECOND STUDY,
AD-609 485 DIV. 23

• • •
64 2406
A HEURISTIC APPROACH TO SOLUTION OF CHECKERBOARD PUZZLES,
AD-609 570 DIV. 30

• • •
64 2410
A SHOCK TUBE WITH QUADRUPOLE MASS FILTER FOR MONITORING HIGH-TEMPERATURE REACTION KINETICS.
AD-609 775 DIV. 30

• • •
64 2429
THE EFFECT OF ADDED ELECTROLYTES ON THE E. S. R. AND OPTICAL ABSORPTION OF METAL AMMONIA SOLUTIONS.
AD-609 557 DIV. 4

• • •
64 2471
RESEARCH ON HYPERSONIC RAREFIED PLASMA FLOWS.
AD-609 496 DIV. 9

• • •
64 2475
A FUNDAMENTAL THEORETICAL AND EXPERIMENTAL STUDY OF ROTARY MAGNETOHYDRODYNAMICS
AD-609 812 DIV. 25

• • •
64 2476
MULTI-LIST SYSTEM: ADDITIONAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 709 DIV. 32

• • •
64 2477
MULTI-LIST SYSTEM: FINAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
AD-609 710 DIV. 32

• • •
64 2483
MODELS FOR ASYMMETRIC INDUCTION IN POLYMERIZATION.
AD-609 558 DIV. 4

• • •
64 2492
RESEARCH IN THE RESTRICTED PROBLEMS OF THREE AND FOUR BODIES.
AD-609 613 DIV. 2

• • •
64 2495
ON THE REALIZATION OF BINARY SWITCHING FUNCTIONS WITH MAJORITY GATES,
AD-609 504 DIV. 7

• • •
64 2496
AN ALGEBRAIC-GEOMETRIC TECHNIQUE FOR THE REALIZATION OF SWITCHING FUNCTIONS WITH M-OUTOF-N DECISION GATES,
AD-609 505 DIV. 7

• • •
64 2498
PREFERENCE, CREDENCE, AND UTILITY,
AD-609 560 DIV. 15

• • •
64 2499
PSYCHOLOGICAL CORRELATES OF PLATEAU HYPNOTIZABILITY IN A SPECIAL VOLUNTEER SAMPLE.
AD-609 713 DIV. 28

• • •
64 2502
INFORMATION AND SCIENTIFIC CREATIVITY,
AD-609 486 DIV. 28

• • •
64 2529
STUDY OF PICTORIAL DATA ANALYSIS CONCEPTS AND TECHNIQUES.
AD-609 711 DIV. 10

• • •
9750
RATE OF SUBLIMATION OF AMMONIUM HALIDES,
AD-609 814 DIV. 4

•AIR FORCE WEAPONS LAB KIRTLAND AFB N MEX

• • •
TR64 107
A LAGRANGIAN FINITE DIFFERENCE METHOD FOR TWO-DIMENSIONAL MOTION INCLUDING MATERIAL STRENGTH.
AD-609 523 DIV. 25

•AIRBORNE INSTRUMENTS LAB INC DEER PARK N Y

• • •
RADAR DATA MEASURING SYSTEM.
(FAA RD64 126)
AD-609 497 DIV. 19

•AMERICAN INST FOR RESEARCH PALO ALTO CALIF

• • •
STUDY OF TRAINING PERFORMANCE EVALUATION TECHNIQUES.
AD-609 605 DIV. 23

•AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY

• • •
OCCUPANCY EXERCISE RESEARCH GUIDE: AN INTRODUCTION TO THE RESEARCH USE OF THE SHELTER EXERCISE FOR TRAINING.
AD-609 480 DIV. 18

•AMERICAN OIL CO WHITING IND

• • •
THE RADIATION CHEMISTRY OF ACETYLENIC COMPOUNDS.
(ML TR64 353)
AD-609 440 DIV. 4

•AMERICAN UNIV WASHINGTON D C

• • •
U. S. ARMY AREA HANDBOOK FOR CYPRUS,
(DA PAM550 22)
AD-609 548 DIV. 32

• • •
U. S. ARMY AREA HANDBOOK FOR ETHIOPIA.
(DA PAM550 28)
AD-609 549 DIV. 32

• • •
U. S. ARMY AREA HANDBOOK FOR THE REPUBLIC OF THE SUDAN.
(DA PAM550 27)
AD-609 550 DIV. 32

• • •
U. S. ARMY AREA HANDBOOK FOR JAPAN,
(DA PAM550 30)
AD-609 551 DIV. 32

• • •
U. S. ARMY AREA HANDBOOK FOR COLOMBIA.
(DA PAM550 26)
AD-609 556 DIV. 32

•ANTI-SUBMARINE WARFARE LAB NAVAL AIR DEVELOPMENT CENTER JOHNSVILLE PA

• • •
6928
DEEXCITATION OF HELIUM ATOMS IN THE METASTABLE TRIPLET STATE (2-3S) IN PURE HELIUM.
AD-609 832 DIV. 4

•ARACON GEOPHYSICS CO CONCORD MASS

• • •
ARA 9219 12
PRACTICAL INTERPRETATION OF METEOROLOGICAL SATELLITE DATA.
(AFCRL 64 807)
AD-609 493 DIV. 2

•ARCON CORP LEXINGTON MASS

• • •
REAL TIME COMPUTATION OF CONFIDENCE ELLIPSOIDS,
AD-609 601 DIV. 19

•ARGONNE CANCER RESEARCH HOSPITAL CHICAGO ILL

• • •
ACRH 102
THE CONSEQUENCES OF INGESTION BY MAN OF REAL AND SIMULATED FALLOUT.
AD-609 629 DIV. 16

•ARMY CHEMICAL-BIOLOGICAL-RADIOLOGICAL ENGINEERING RGROUP ARMY CHEMICAL CENTER

• • •
ENGS SR 1
VALUE ANALYSIS (VALUE ENGINEERING). A TECHNIQUE FOR OBTAINING MORE VALUE FOR THE DEFENSE DOLLAR.
AD-609 520 DIV. 18

•ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

• • •
USAEL PRIMARY FREQUENCY STANDARDS.
(ECOM 2479)
AD-609 795 DIV. 8

• • •
ECOM 2508
ELECTRONICALLY FUNCTIONAL ORGANIC MATERIALS.
AD-609 831 DIV. 25

•ARMY ELECTRONICS LABS FORT MONMOUTH N J

• • •
1789TR
PROJECT BEARS (BACTERIOLOGICAL EFFECTS, AIRCRAFT REFUELING SYSTEMS).
AD-609 527 DIV. 10

•ARMY ELECTRONICS LABS FORT MONMOUTH N J

• • •
ECOM2516
EFFECT OF MAGNETIC FIELDS ON MICROWAVE GAS-DISCHARGE DUPLEXER CHARACTERISTICS,
AD-609 658 DIV. 8

• • •
TR2417
MAGNETIC PROPERTIES OF ELECTRODEPOSITED NICKEL-IRON-COBALT FILMS,
AD-609 829 DIV. 17

•ARMY ENGINEER RESEARCH AND DEVELOPMENT LABS FORT BELVOIR VA

• • •
PROJECT BEARS (BACTERIOLOGICAL EFFECTS, AIRCRAFT REFUELING SYSTEMS).
(AEROL 1789TR)
AD-609 527 DIV. 10

•ARMY LIMITED WAR LAB ABERDEEN PROVING GROUND MD

• • •
ALWL TM 64 06
BIOSENSING TECHNICS FOR HUMAN DETECTION. 1. THE FROG SKIN TRANSDUCER: PRELIMINARY EXPERIMENT.
AD-609 436 DIV. 6

•ARMY MATERIALS RESEARCH AGENCY WATERTOWN MASS

• • •
TR64 26
ELECTROMAGNETIC TEST CONTROL REQUIREMENTS,
AD-609 438 DIV. 30

• • •
TR64 28

DEVELOPMENT OF A STRUCTURAL URANIUM ALLOY,
AD-609 559 DIV. 17

• • •

TR64 32
VIBRATIONAL LEVELS IN LIQUID BROMINE BY NEUTRON INELASTIC SCATTERING,
AD-609 678 DIV. 20

•ARMY MEDICAL RESEARCH LAB FORT KNOX KY

• • •

TR64 104
TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY AND LEARNING.
AD-609 811 DIV. 28

• • •

TR64 108
AN EVALUATION OF MULTIPLE TRACKS IN A LINEAR PROGRAM.
AD-609 801 DIV. 23

• • •

TR64 110
MOMENTS OF INERTIA AND CENTERS OF GRAVITY OF THE LIVING HUMAN BODY ENCUMBERED BY A FULL-PRESSURE SUIT.
AD-609 863 DIV. 16

• • •

TR64 114
LEARNING SET FORMATION IN PROGRAMMED INSTRUCTION.
AD-609 802 DIV. 23

•ARMY MISSILE COMMAND REDSTONE ARSENAL ALA

• • •

DV TM23 59
THERMAL DESIGN TESTS OF THE IGY SATELLITE. (PAYLOAD FOR MISSILE NO. 16),
AD-609 991 DIV. 12

•ARMY RESEARCH OFFICE DURHAM N C

• • •

2099 22
RARE EARTH IONS IN CRYSTALLINE FIELDS.
AD-609 941 DIV. 20

• • •

3365 2
ALGORITHM FOR SOLVING VOLTERRA INTEGRAL EQUATIONS MET IN PROCESS IDENTIFICATION.
AD-609 864 DIV. 15

•ARMY TRANSPORTATION RESEARCH COMMAND FORT EUSTIS VA

• • •

TR64 90
ADVANCED FLIGHT CONTROL SYSTEM CONCEPTS FOR VTOL AIRCRAFT.
AD-609 593 DIV. 1

•ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AIR FORCE STATION TENN

• • •

TDR64 277
LAMINAR BOUNDARY-LAYER SEPARATION ON FLARED BODIES AT SUPERSONIC AND HYPERSONIC SPEEDS,
AD-609 841 DIV. 9

•ASSEMBLY PRODUCTS INC CHESTERLAND OHIO

• • •

PRODUCTION ENGINEERING MEASURE FOR METERS, TAUT-BAND SUSPENSION, A-C MOVING IRON VANE PER SIGNAL CORPS REQUIREMENTS SCS-160.
AD-609 910 DIV. 7

•ASTROSYSTEMS INTERNATIONAL INC FAIRFIELD N J

• • •

ASTROSYS TR 64001F
MONITORING OF ROCKET ENGINE PERFORMANCE BY SPECTROSCOPIC TECHNIQUES.
(FDL TR64 163)
AD-609 492 DIV. 27

•ATLANTIC RESEARCH CORP ALEXANDRIA VA

• • •

CASTABLE CARBON FOR NOZZLE APPLICATIONS.
(RPL TR64 183)
AD-609 607 DIV. 27

•ATMOSPHERIC RESEARCH LAB OKLAHOMA UNIV RESEARCH INST NORMAN

• • •

ARL(UORI) 1297 9
DIURNAL AND SEMIDIURNAL VARIATIONS OF ISOPYCNIC SURFACES UP TO THE MESOPAUSE AS INFERRED BY THE 4IN9 FIELD.
AD-609 723 DIV. 2

•AVCO-EVERETT RESEARCH LAB EVERETT MASS

• • •

AVCO RR 202
THE DIOCOTRON INSTABILITY IN A CYLINDRICAL GEOMETRY
AD-609 638 DIV. 8

• • •

RR 197
THE NEAR WAKE OF A WEDGE (BSD TDR64 150)
AD-609 577 DIV. 9

•BALLISTIC SYSTEMS DIV NORTON AFB CALIF

• • •

TDR64 150
THE NEAR WAKE OF A WEDGE
AD-609 577 DIV. 9

•BARCELONA UNIV (SPAIN)

• • •

A STUDY OF THE SYNTHESIS AND PROPERTIES OF ALKAROMATIC CHLOROCARBONS.
(ARL 64 141)
AD-609 569 DIV. 9

•BARKLEY AND DEXTER LABS INC FITCHBURG MASS

• • •

LASER ACTIVITIES AND BACKGROUND RADIATION STUDIES.
(AFCRL 64 1003)
AD-609 759 DIV. 25

•BAUSCH AND LOMB INC ROCHESTER N Y

• • •

INFRARED COATING STUDIES.
AD-609 779 DIV. 14

•BEERS (ROLAND F) INC ALEXANDRIA VA

• • •

ANALYSIS OF SHOAL DATA ON GROUND MOTION AND CONTAINMENT SAFETY PROGRAM.
(ARPA VUF1013)
AD-609 879 DIV. 20

•BENDIX SYSTEMS DIV BENDIX CORP ANN ARBOR MICH

• • •

BENDIX BSC 28291
THE RADAR CROSS SECTION OF AN IONIZED WAKE OF A HYPERSONIC BODY,
AD-609 512 DIV. 6

• • •

BENDIX FS 61TN 1013
THE RADAR CROSS SECTION OF AN IONIZED WAKE OF A HYPERSONIC BODY,
AD-609 512 DIV. 6

• • •

BENDIX FS 61TN 1015
THERMAL EMISSION OF NEUTRAL CESIUM.
AD-609 584 DIV. 25

• • •

BSC 28292
THERMAL EMISSION OF NEUTRAL CESIUM.
AD-609 584 DIV. 25

•BERYLLIUM CORP READING PA

• • •

PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
AD-609 686 DIV. 8

•BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH

• • •

BOEING MATH 372
PATHS IN POLYHEDRA. I
AD-609 571 DIV. 15

• • •

BOEING MATH 373
PATHS IN POLYHEDRA. II,
AD-609 498 DIV. 15

• • •

BOEING MATH 375
A CLASS OF LINEAR PROGRAMMING PROBLEMS REQUIRING A LARGE NUMBER OF ITERATIONS,
AD-609 586 DIV. 15

• • •

D1 82 0382
PATHS IN POLYHEDRA. I
AD-609 571 DIV. 15

• • •

D1 82 0383
PATHS IN POLYHEDRA. II,
AD-609 498 DIV. 15

• • •

D1 82 0387
A CLASS OF LINEAR PROGRAMMING PROBLEMS REQUIRING A LARGE NUMBER OF ITERATIONS,
AD-609 586 DIV. 15

•BRANDEIS UNIV WALTHAM MASS

• • •

ON THE COMPOSITION OF DILUTE ALKALI METALAMMONIA SOLUTIONS.
AD-609 578 DIV. 9

•BROWN UNIV PROVIDENCE R I DIV OF APPLIED MATHEMATICS

• • •

MULTIPLE INTEGRAL REPRESE NTATION OF MECHANICAL BEHAVIOR OF POLYETHYLENE.
AD-609 657 DIV. 19

•BROWN UNIV PROVIDENCE R I

• • •

A DIGITAL FERRITE PHASE SHIFTER. A STUDY OF THE DIFFE RENTIAL PHASE SHIFT IN CIRCULAR CYLINDRICAL WAVEGUIDES CONTAINING CIRCUMFERENTIALLY MAGNETIZED FERRITE RODS AND TUBES UNDER TRANSVERSE ELECTRIC MODE EXCIT ATION,
AD-609 499 DIV. 8

• • •

EXTENDED DISPLACEMENT ROUND THEOREMS FOR WORK HARDENING CONTINUA SUBJECTED TO IMPULSIVE LOADING.
AD-609 760 DIV. 25

• • •

WT(BU) 90
A. C. SOLENOID OF FINITE LENGTH IN A CONDUCTING MEDIUM WITH HALL CONDUCTIVITY,
(AFOSR 64 2028)
AD-609 962 DIV. 25

•BUNO CO MCLEAN VA INFORMATION SCIENCES CENTER

• • •

STUDY OF PICTORIAL DATA ANALYSIS CONCEPTS AND TECHNIQUES.
(AFOSR 64 2929)
AD-609 711 DIV. 18

•BUREAU OF NAVAL WEAPONS NAVY DEPT WASHINGTON D C

• • •

8485
THE LCU 1496 MOBILE TEST FACILITY.
AD-609 878 DIV. 22

•BUREAU OF RECLAMATION DENVER COLO

• • •

CHE 39
CORROSION INVESTIGATIONS, TRACY-RED BLUFF, CALIFORNIA, ENV DIRECT-CURRENT TESTS.
AD-609 766 DIV. 17

•BUREAU OF SOCIAL SCIENCE RESEARCH INC WASHINGTON D C

• • •

BSSR 394 5
HISTORICAL INCIDENTS OF EXTREME OVERCROWDING.
AD-609 752 DIV. 32

•BURROUGHS CORP RADNOR PA

• • •

STORM RADAR DATA PROCESSOR EVALUATION.
AD-609 820 DIV. 2

•CALIFORNIA UNIV BERKELEY

• • •

ALGEBRAIC THEORY OF MACHINES. I. THE MAIN DECOMPOSITION THEOREM. PRIME DECOMPOSITION THEOREM FOR FINITE SEMIGROUPS.
AD-609 581 DIV. 30

•CALIFORNIA UNIV LOS ANGELES
• • •
A SIMPLE LINEAR MODEL FOR VOWEL PERCEPTION,
AD-609 453 DIV. 14
• • •
LATERALIZATION OF SOUNDS AT THE UNSTIMULATED EAR OPPOSITE TO A NOISE-ADAPTED EAR.
AD-609 456 DIV. 28
• • •
THE DETECTION OF MARKOVIAN SEQUENCES OF SIGNALS.
AD-609 457 DIV. 28
• • •
RARE EARTH IONS IN CRYSTALLINE FIELDS.
(AROD 2099 22)
AD-609 541 DIV. 20
• • •
MODELS FOR ASYMMETRIC INDUCTION IN POLYMERIZATION.
(AFOSR 64 2463)
AD-609 588 DIV. 4

•CALVIN COLL GRAND RAPIDS MICH
• • •
LOW TEMPERATURE CYCLING BEHAVIOR OF THE SILVER ELECTRODE.
AD-609 876 DIV. 7

•CARNEGIE INST OF TECH PITTSBURGH PA GRADUATE SCHOOL OF INDUSTRIAL ADMINISTRATION
• • •
ONR RM 139
THE EFFECTS OF GOAL DIFFICULTY ON PERFORMANCE: A FIELD EXPERIMENT,
AD-609 508 DIV. 28

•CBS LABS STAMFORD CONN
• • •
CLD 1720
PERSONNEL COMMUNICATIONS IN SPACE. A STUDY OF SPEECH TRANSMISSION AND HELMET COMFORT.
(AL TDR64 178 S1)
AD-609 604 DIV. 29

•CINCINNATI UNIV OHIO
• • •
EXTENSION OF THE M2- AND THE THIN-WING EXPANSION METHODS TO MAGNETOHYDRODYNAMICS.
(ARL 64 176)
AD-609 568 DIV. 4
• • •
THE DETERMINATION OF CHLORINE AND IONIC CHLORIDE IN ORGANIC COMPOUNDS.
(NL TR64 344)
AD-609 650 DIV. 4

•CLIMAX MOLYBDENUM CO OF MICHIGAN DETROIT
• • •
STUDIES OF REFRACTORY ALLOY SHEET MATERIALS.
AD-609 815 DIV. 17

•COATING AND CHEMICAL LAB ABERDEEN PROVING GROUND MD
• • •
170
INFLUENCE OF PRESSURE ON SLUDGING OF P-C-437 STEAM CLEANERS,
AD-609 662 DIV. 29
• • •
171
THE ENERGETICS OF MICELLAR SOLUBILIZATION, AN ACTION OF THE DETERGENCY MECHANISM.
AD-609 665 DIV. 14
• • •
172
PRESERVATIVE TREATMENT OF WOOD FOR COMBAT VEHICLES.
AD-609 663 DIV. 14
• • •
173
DETERMINATION OF STYRENE MONOMER IN POLYESTER RESINS BY GAS-LIQUID CHROMATOGRAPHY.
AD-609 664 DIV. 4

•COLUMBIA UNIV NEW YORK SCHOOL OF ENGINEERING AND APPLIED SCIENCE
• • •
MARKOVIAN DECISION MODELS FOR REJECT ALLOWANCE PROBLEMS.
AD-609 677 DIV. 24

•COLUMBIA UNIV NEW YORK
• • •
TOPICS IN ANALYSIS. THEORETICAL MATHEMATICS.
AD-609 619 DIV. 15

•CONTINENTAL ELECTRONICS MFG CO DALLAS TEX
• • •
AN/FPA-22(XN-1), AN/FPA-23(XN-1), L/UHF-BAND PENCIL BEAM RADARS.
(RADC TDR64 236)
AD-609 633 DIV. 6

•COORDINATED SCIENCE LAB UNIV OF ILLINOIS URBANA
• • •
CSL R 186
A DESCRIPTIVE LIST OF PLATO LESSON PROGRAMS, 1960-1964,
AD-609 699 DIV. 23
• • •
CSL R 235
DETECTION OF RATE CHANGES IN PERIODIC PHENOMENA,
AD-609 698 DIV. 28
• • •
CSL R 237
STATE MODELS OF ACTIVE RLC NETWORKS,
AD-609 700 DIV. 8

•CORNELL AERONAUTICAL LAB INC BUFFALO N Y
• • •
RM 1744 S 2
INVESTIGATIONS OF ADAPTIVE DETECTION TECHNIQUES.
AD-609 799 DIV. 8
• • •
UB 1363 P 6
PROJECT WIDE BAND.
(RADC TDR64 461)
AD-609 619 DIV. 6

•CORNELL-DUBILIER ELECTRIC CORP NEW BEDFORD MASS
• • •
PEN FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200C.
AD-609 639 DIV. 8

•CORNING GLASS WORKS BRADFORD PA
• • •
MULTIPLE TAPPED PHOTOELASTIC DELAY LINE.
(RADC TDR64 434)
AD-609 579 DIV. 25

•CRUFT LAB HARVARD UNIV CAMBRIDGE MASS
• • •
CRUFT TR 454
AN EXPONENTIALLY CONVERGENT AND FINITE ALGORITHM FOR LINEAR INEQUALITIES,
AD-609 777 DIV. 15
• • •
CRUFT TR 457
DIFFERENTIAL GAMES AND OPTIMAL PURSUIT-EVASION STRATEGIES
AD-609 772 DIV. 19

•CRYSTALONICS INC CAMBRIDGE MASS
• • •
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND TO INSURE THE RELIABILITY OF THE C400 SERIES FIELD EFFECT TRANSISTORS.
AD-609 596 DIV. 8

•CUBIC CORP SAN DIEGO CALIF
• • •
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME II. DETAILED ANALYSIS OF ANTENNAS, PROPAGATION, POLARIZATION, AND PERFORMANCE.
(RADC TDR64 318 V2)
AD-609 751 DIV. 12
• • •
FER/88 1
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME I. SYSTEM DESCRIPTION AND ANALYSIS.
(RADC TDR64 318 V1)
AD-609 750 DIV. 12

•DAVID TAYLOR MODEL BASIN WASHINGTON D C
• • •
1848
FORCED VIBRATION OF BEAMS AND FLUTTER OF BEAM-FOIL SYSTEMS
AD-609 499 DIV. 9
• • •
1928
WAKE ANALYSIS OF SHIP MODELS TWIN-SCREW MILITARY TYPES,
AD-609 598 DIV. 9
• • •
5641
INTRODUCTION TO NON-LINEAR MECHANICS. PART IV. RELAXATION OSCILLATIONS,
(ATI 121 427)
AD-609 701 DIV. 25
• • •
6171
THE USE OF DOUBLY REFRACTING SOLUTIONS IN THE INVESTIGATION OF FLUID FLOW PHENOMENA,
(PB 106 613 CANCELED)
AD-609 632 DIV. 9
• • •
6321
PREPARATION DATA FOR COMPUTATION OF VERTICAL FLEXURAL MODES OF HULL VIBRATION BY DIGITAL PROCESS,
(PB 163 877 CANCELED)
AD-609 630 DIV. 31
• • •
7151
THE STEADY-STATE RESPONSE OF A SHIP HULL TO A SIMPLE HARMONIC DRIVING FORCE COMPUTED BY A DIGITAL PROCESS,
(PB 163 878 CANCELED)
AD-609 631 DIV. 31
• • •
7701
CRITICAL PRESSURES FOR THE INCEPTION OF CAVITATION IN A LARGE-SCALE NUMACHI NOZZLE AS INFLUENCED BY THE AIR CONTENT OF THE WATER,
(PB 166 396 CANCELED)
AD-609 629 DIV. 9

•DAVIDSON LAB STEVENS INST OF TECH HOBOKEN N J
• • •
SIT DL 1046
EXPERIMENTAL DETERMINATION OF WAVEEXCITED FORCES AND MOMENTS ACTING ON A SHIP MODEL RUNNING IN OBLIQUE REGULAR WAVES,
AD-609 896 DIV. 9

•DEBELL AND RICHARDSON INC HAZARDVILLE CONN
• • •
GLASS/RESIN INTERFACE: PATENT SURVEY, PATENT LIST, AND GENERAL BIBLIOGRAPHY,
(PLASTEC 18)
AD-609 926 DIV. 14

•DECO ELECTRONICS INC BOULDER COLO
• • •
DECO 30 P 7
DYNAMIC ELECTRICAL MODELING OF ELECTRODES MOVING IN SEA WATER.
AD-609 717 DIV. 8

•DEFENSE ATOMIC SUPPORT AGENCY WASHINGTON D C
• • •
1266 4
STRESS PROPAGATION IN SOILS.
AD-609 598 DIV. 2

•DEFENSE RESEARCH LAB UNIV OF TEXAS AUSTIN
• • •
DRL 222
VIBRATION OF RECTANGULAR AND SKEW CANTILEVER PLATES REPRESENTING IDEALIZED MISSILE FINS,
AD-609 742 DIV. 12

•DETROIT ARSENAL CENTER LINE MICH
• • •
PAM550 20
U. S. ARMY AREA HANDBOOK FOR BRAZIL,
AD-609 483 DIV. 18

• • •
PAM550 22
U. S. ARMY AREA HANDBOOK FOR CYPRUS,
AD-609 548 DIV. 32
• • •
PAM550 26
U. S. ARMY AREA HANDBOOK FOR COLOMBIA.
AD-609 556 DIV. 32
• • •
PAM550 27
U. S. ARMY AREA HANDBOOK FOR THE REPUBLIC OF THE SUDAN.
AD-609 550 DIV. 32
• • •
PAM550 28
U. S. ARMY AREA HANDBOOK FOR ETHIOPIA.
AD-609 549 DIV. 32
• • •
PAM550 30
U. S. ARMY AREA HANDBOOK FOR JAPAN,
AD-609 551 DIV. 32

•DOUGLAS AIRCRAFT CO INC LONG BEACH CALIF
• • •
LB 31693
SOLUTIONS OF THE MAGNETOFLUID-DYNAMIC BOUNDARY-LAYER EQUATIONS FOR A FLAT PLATE WITH A MOVING TRANSVERSE MAGNETIC FIELD SOURCE OR CROSSED ELECTRIC FIELD IN THE SPANWISE DIRECTION
AD-609 534 DIV. 9
•DOUGLAS AIRCRAFT CO INC SANTA MONICA CALIF
• • •
SM 47785
STUDY OF RESIDUAL STRESSES IN THICK GLASS FILAMENT REINFORCED LAMINATES.
AD-609 610 DIV. 14

•DUNLAP AND ASSOCIATES INC SANTA MONICA CALIF
• • •
A METHOD FOR DERIVING JOB STANDARDS FROM SYSTEM EFFECTIVENESS CRITERIA. VOLUME I. METHOD DEVELOPMENT,
AD-609 725 DIV. 23
•ELECTRONIC SYSTEMS DIV AIR FORCE SYSTEMS COMMAND BEDFORD MASS
• • •
TDR 64 656 V2
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME II. SIMCOM AND SIMSCRIPT SIMULATION TECHNIQUES: A COMPARISON.
AD-609 764 DIV. 18
• • •
TDR64 148 V1
PROCEEDINGS OF THE TROPOS PHERIC REFRACTION EFFECTS MEETING (NO. 3). VOLUME I. RESULTS AND STATUS OF TROPOSPHERIC-EFFECTS MEASUREMENT PROGRAM.
AD-609 731 DIV. 8
• • •
TDR64 149
THE EFFECTS OF MISMATCH AND DISTORTION ON THE OUTPUT SIGNAL OF A LINEAR FM PULSE-COMPRESSION FILTER,
AD-609 478 DIV. 8
• • •
TDR64 156
ORBITAL FLIGHT AND COVERAGE SIMULATION,
AD-609 502 DIV. 12
• • •
TDR64 164
VULNERABILITY OF MANNED ORBITAL COMMAND POSTS TO NATURAL SPACE RADIATIONS,
AD-609 501 DIV. 12
• • •
TDR64 167
SYSTEM INSTALLATION AND TESTING,
AD-609 477 DIV. 18
• • •
TDR64 169
THE ROLE OF SIMULATION AND DATA REDUCTION PROGRAMS IN THE DEVELOPMENT OF REAL-TIME SYSTEMS.
AD-609 500 DIV. 30
• • •
TDR64 171
THE MINIMUM NUMBER OF LINEAR DECISION FUNCTIONS TO IMPLEMENT A DECISION PROCESS
AD-609 476 DIV. 19
• • •
TDR64 514
ON-SITE CATEGORY I PART I, ACCEPTANCE OF THE DATA DISPLAY CENTRAL GROUP DISPLAY CHAIN, AND CATEGORY II, PART I, INTEGRATION OF THE DATA DISPLAY CENTRAL GROUP DISPLAY AND REQUEST CHAINS WITH THE ELECTRONIC DATA TRANSMISSION COMMUNICATIONS CENTRAL.
AD-609 773 DIV. 9
• • •
TDR64 548
SOLID STATE TACAN.
AD-609 810 DIV. 19
• • •
TDR64 561
SOLID STATE RESEARCH.
AD-609 828 DIV. 25
• • •
TDR64 583
ALGORITHMS FOR ESTIMATING A RE-ENTRY BODY'S POSITION, VELOCITY AND BALLISTIC COEFFICIENT IN REAL TIME OR FOR POST FLIGHT ANALYSIS.
AD-609 529 DIV. 12
• • •
TDR64 587
DIVISION 7. ENGINEERING.
AD-609 872 DIV. 9
• • •
TDR64 620
HUMAN USE OF SHORT TERM MEMORY IN PROCESSING INFORMATION ON A CONSOLE,
AD-609 749 DIV. 30
• • •
TDR64 635
EFFICIENCY OF A ROUTING SCHEME IN A MOBILE DATA PROCESSING COMMUNICATION NETWORK,
AD-609 774 DIV. 8
• • •
TDR64 656 V1
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME I. SIMULATION OF 473L SYSTEM OVER A RANGE OF OPERATING CONDITIONS.
AD-609 763 DIV. 18
• • •
TDR64 656 V3
SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME III. ANALYSIS OF SERIAL AND PARALLEL FILE STRUCTURES.
AD-609 765 DIV. 18
• • •
TDR65 26
A LARGE APERTURE SEISMIC ARRAY.
AD-609 851 DIV. 6

•ELECTRONIC SYSTEMS LAB MASS INST OF TECH CAMBRIDGE
• • •
ESL R 209
ALGORITHM FOR SOLVING VOLTERRA INTEGRAL EQUATIONS MET IN PROCESS IDENTIFICATION. (ARDD 3365 2)
AD-609 864 DIV. 19

•ELECTRONICS RESEARCH LAB UNIV OF CALIFORNIA BERKELEY
• • •
ERL 64 26
ON THE RELATION BETWEEN ORDINARY AND STOCHASTIC DIFFER ENTIAL EQUATIONS,
AD-609 826 DIV. 19
• • •
ERL 64 45
TECHNIQUES FOR AUTOMATING THE CONSTRUCTION OF TRANSLATORS FOR PROGRAMMING LANGUAGES
AD-609 487 DIV. 30

•ELECTRO-MECHANICS CO AUSTIN TEX
• • •
BRIDGED 'T' EXTENSION. (RADC TDR64 316)
AD-609 479 DIV. 8

•ENGINEERING PROJECTS LAB MASS INST OF TECH CAMBRIDGE
• • •
DSR 8998 8
BASIC APPLIED RESEARCH IN FLUID POWER CONTROL. (FDL TDR64 127)
AD-609 692 DIV. 12
• • •
DSR 9960 1
HUMAN USE OF SHORT TERM MEMORY IN PROCESSING INFORMATION ON A CONSOLE, (ESD TDR64 620)
AD-609 749 DIV. 30

•EYE RESEARCH FOUNDATION BETHESDA MD
• • •
RETINAL SENSITIVITY DURING PHOTOPIC ADAPTATION.
AD-609 511 DIV. 16

•FAIRCHILD SPACE AND DEFENSE SYSTEMS SYOSSET N Y
• • •
DESIGN AND DEVELOPMENT OF MECHANICAL MODULAR PROGRAMMER.
AD-609 737 DIV. 22

•FEDERAL AVIATION AGENCY WASHINGTON D C
• • •
ADS19
STRUCTURAL DESIGN FOR FUEL CONTAINMENT UNDER SURVIVABLE CRASH CONDITIONS.
AD-609 615 DIV. 1
• • •
RD64 126
RADAR DATA MEASURING SYSTEM.
AD-609 497 DIV. 19

•FIRESTONE FLIGHT SCIENCES LAB CALIF INST OF TECH PASADENA
• • •
GALCIT SM 64 13
THE STRESSES IN A CYLINDRICAL SHELL CONTAINING AN AXIAL CRACK, (ARL 64 174)
AD-609 669 DIV. 25

•FLORIDA UNIV GAINESVILLE COLL OF ENGINEERING
• • •
RESPONSE OF A THIN SHELL TO A SHOCK WAVE.
AD-609 865 DIV. 22

•FOREIGN TECH DIV AIR FORCE SYSTEMS COMMAND WRIGHT-PATTERSON AFB OHIO
• • •
TT63 852:
GASDYNAMICS OF ENGINES (TT 65 60474)
AD-609 452 DIV. 2
• • •
TT64 1270:
INFLUENCE OF ALLOYING ON THE HARDNESS OF NIAL AND ITS SOLID SOLUTIONS, (TT 65 60583)
AD-609 783 DIV. 17
• • •
TT64 1369:
ELECTRIC AND MAGNETIC PROPERTIES OF THERMALLY TREATED FERROCENE BASE POLYMERS, (TT 65 60582)
AD-609 782 DIV. 9
• • •
TT64 286:
CERTAIN PHYSIOLOGICAL SHIFTS IN THE HUMAN ORGANISM DURING ACCLIMATIZATION IN THE INTRACONTINENTAL REGIONS OF ANTARCTICA, (TT 65 60590)
AD-609 790 DIV. 16
• • •
TT64 335:
LONGITUDINAL STABILITY OF AN AIRPLANE WITH DELAYED ACTION AUTOPILOT, (TT 65 60581)
AD-609 781 DIV. 1
• • •
TT64 394:
NONSYMMETRICAL BUCKLING OF A FLAT ROUNDED SHELL WITH INITIAL DEFORMATION FROM EXTERNAL PRESSURE, (TT 65 60592)
AD-609 780 DIV. 25
• • •
TT64 377:
CONNECTION OF AERODYNAMIC HEAT WITH SKIN FRICTION, (TT 65 60588)
AD-609 788 DIV. 9

• • •

TT64 383:
CALCULATION OF MAXIMUM APPLICABLE FREQUENCIES FOR COMMUNICATION BETWEEN TWO POINTS BY A DIGITAL COMPUTER
(TT 65 60891)
AD-609 794 DIV. 8

• • •

TT64 394:
ELECTROPHYSICAL PROPERTIES OF CERTAIN AROMATIC BETAINES
(TT 65 60985)
AD-609 785 DIV. 25

• • •

TT64 420:
EQUILIBRIUM OF FLEXIBILE PLASTIC-PLASTIC SHELLS AND PLATES,
(TT 65 60986)
AD-609 786 DIV. 25

• • •

TT64 440:
ABOUT REACTIONS OF 8-OXYQUINOLINE TRIBUTOXY TITANIUM WITH D, W-DIHYDROXY-POLYDIMETHYL SILOXANE,
(TT 65 60987)
AD-609 787 DIV. 4

• • •

TT64 487:
METHOD OF MEASURING DISTANCE
(TT 65 60989)
AD-609 789 DIV. 2

• • •

TT64 71:
THE ELECTRONIC INTERLOCUTOR -AND THE MACHINE SAID IN RESPONSE
(TT 65 60984)
AD-609 784 DIV. 30

•FRICK CHEMICAL LAB PRINCETON UNIV N J

• • •

STUDIES IN IONIC COPOLYME RIZATION.
(AFOSR 487)
AD-609 697 DIV. 4

•GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

• • •

GDC 64 222
STRUCTURAL DESIGN FOR FUEL CONTAINMENT UNDER SURVIVABLE CRASH CONDITIONS.
(FAA ADS19)
AD-609 619 DIV. 1

• • •

ZR 658 031
COMBUSTION CHARTS FOR HIGH ENERGY FUELS. II. A DESCRIPTION OF A GENERAL METHOD FOR CALCULATING EQUILIBRIUM CONCENTRATIONS OF COMBUSTION PRODUCTS,
AD-609 592 DIV. 10

•GENERAL ELECTRIC CO PHILADELPHIA PA

• • •

AN UNCOOLED, RAPID RESPONSE PROBE FOR MEASURING STAGNATION PRESSURES IN HIGH VELOCITY ARC PLASMA.
(ARL 64 192)
AD-609 621 DIV. 25

•GENERAL ELECTRIC CO SYRACUSE N Y

• • •

PRODUCTION ENGINEERING MEASURE ON HIGH PERVEANCE CATHODE-RAY TUBES.
AD-609 563 DIV. 8

• • •

SEMICONDUCTOR LASER AMPLIFIER TECHNIQUES (SEMLAM).
(RADC TDR64 384)
AD-609 704 DIV. 25

• • •

INVESTIGATION OF FERRITE PHASE SHIFTERS AT C-AND X-BAND.
AD-609 813 DIV. 8

• • •

PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
AD-609 843 DIV. 8

•GENERAL ELECTRIC CO WASHINGTON D C

• • •

SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME I. SIMULATION OF 473L SYSTEM OVER A RANGE OF OPERATING CONDITIONS.
(ESD TDR64 696 VI)
AD-609 763 DIV. 18

• • •

SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME II. SIMCOM AND SIMSCRIPT SIUMLATION TECHNIQUES: A COMPARISON.
(ESD TDR 64 696 V2)
AD-609 764 DIV. 18

• • •

SIMULATION AND ANALYSIS OF 473L SYSTEM. VOLUME III. ANALYSIS OF SERIAL AND PARALLEL FILE STRUCTURES.
(ESD TDR64 696 V3)
AD-609 765 DIV. 18

•GEORGIA INST OF TECH ATLANTA ENGINEERING EXPERIMENT STATION

• • •

SLIP-CAST FUSED SILICA
(NL TDR64 195)
AD-609 667 DIV. 12

•GRUMMAN AIRCRAFT ENGINEERING CORP BETHPAGE N Y

• • •

PRESSURE MEASUREMENTS FOR MACH 8 FLOWS OVER EXPANSION CORNERS AND RAMPS ON AN INTERNALLY COOLED MODEL. PART II. FLOWS OVER A FLAT PLATE WITH AND WITHOUT A PARTIAL SPAN RAMP. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS.
(RTD TDR63 4044 P2)
AD-609 498 DIV. 9

• • •

PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR MACH 21 FLOWS OVER A BLUNT PYRAMIDAL CONFIGURATION WITH AERODYNAMIC CONTROLS. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS
(FDL TDR64 120)
AD-609 559 DIV. 9

•HARRY DIAMOND LABS WASHINGTON D C

• • •

TM64 23
HUMAN BREATHING PARAMETERS AND COMMERCIAL AUTOMATIC RESPIRATORS,
AD-609 732 DIV. 16

• • •

TR1250
ANALOG COMPUTER TECHNIQUES FOR PROBLEMS IN COMPLEX VARIABLES
AD-609 733 DIV. 30

•HEAT TRANSFER LAB UNIV OF MINN MINNEAPOLIS

• • •

THERMAL CHARACTERISTICS OF A HIGH AND LOW MASS FLUX ARGON PLASMA JET.
(ARL 64 191)
AD-609 622 DIV. 25

• • •

THERMODYNAMIC PROPERTIES OF CARBONNITROGEN MIXTURES AT HIGH TEMPERATURES.
(ARL 64 149)
AD-609 670 DIV. 25

•HELIODYNE CORP LOS ANGELES CALIF

• • •

RE-ENTRY PHYSICS RESEARCH.
AD-609 736 DIV. 9

•HERCULES POWDER CO MAGNA UTAH

• • •

MTO 301
STRESS ANALYSIS OF A CYLINDER PRESSURELOADED OVER EQUAL AND OPPOSITE ARCS.
AD-609 640 DIV. 25

•HEXCEL PRODUCTS INC BERKELEY CALIF

• • •

DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 867 DIV. 26

• • •

DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 868 DIV. 26

• • •

DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
AD-609 871 DIV. 26

•HIGH ENERGY PHYSICS LAB STANFORD UNIV CALIF

• • •

HEPL 393
LINEAR ELECTRON ACCELERATOR PROJECT.
AD-609 587 DIV. 20

•HIGH VELOCITY LAB UNIV OF UTAH SALT LAKE CITY

• • •

PENETRATION AND CRATERING.
AD-609 642 DIV. 12

• • •

UU 4
CRATERING PRODUCED IN METALS BY HIGHVELOCITY IMPACT
(AFBMD TR59 21)
AD-609 641 DIV. 22

•HUGHES AIRCRAFT CO CULVER CITY CALIF

• • •

HAC 2732.01/23
JANAIR: JOINT ARMY-NAVY AIRCRAFT INSTRUMENTATION RESEARCH. ANALYSIS OF PICTORIAL DISPLAYS,
AD-609 762 DIV. 1

• • •

P 64 105
STUDY OF ADVANCED ANTENNA SYSTEMS PROBLEMS FOR SPACE VEHICLES.
(AFCRL 64 950)
AD-609 703 DIV. 6

• • •

TM 804
ROLE OF THE TECHNICAL LIBRARY IN SUPPORT OF AN INFORMATION CENTER,
AD-609 829 DIV. 92

•HUGHES AIRCRAFT CO OCEANSIDE CALIF

• • •

RESEARCH AND DEVELOPMENT OF TWO-COLOR DIRECT VIEW STORAGE TUBE WITH SELECTIVE ERASURE.
AD-609 991 DIV. 8

•HYDRAULIC ENGINEERING LAB UNIV OF TEXAS AUSTIN

• • •

HYD 04 6402
SEPARATION IN A NON-UNIFORM SHEAR FLOW,
AD-609 778 DIV. 4

•IIT RESEARCH INST CHICAGO ILL

• • •

IITRI B6021 5
VANADIUM ALLOY STUDIES.
AD-609 727 DIV. 17

•ILLINOIS UNIV URBANA ENGINEERING EXPERIMENT STATION

• • •

ON ANALYTIC CONTINUATION OF A CLOSED REGION SOLUTION TO AN OPEN REGION.
(AFCRL 64 952)
AD-609 857 DIV. 8

•ILLINOIS UNIV URBANA

• • •

A SHOCK TUBE WITH QUADRUPOLE MASS FILTER FOR MONITORING HIGH-TEMPERATURE REACTION KINETICS.
(AFOSR 64 2410)
AD-609 775 DIV. 30

•INSTITUTE FOR TUBERCULOSIS RESEARCH UNIV OF ILLINOIS RCHICAGO

• • •

INJURY OF THE SKIN.
AD-609 860 DIV. 16

•INSTITUTE OF BEHAVIORAL RESEARCH TEXAS CHRISTIAN UNIV FORT WORTH

• • •

DIMENSIONS OF STIMULUS SITUATIONS WHICH ACCOUNT FOR BEHAVIOR VARIANCE.
AD-609 739 DIV. 28

•INSTITUTE OF GEODESY PHOTOGRAMMETRY AND CARTOGRAPHY OHIO STATE UNIV RESEARCH FOUNDATION

• • •

IGPC 46
THE BOUNDARY VALUE PROBLEM OF PHYSICAL GEODESY.
(AFCRL 69 033)
AD-609 455 DIV. 2

•INSTRUMENTATION LAB MASS INST OF TECH CAMBRIDGE

• • •

R 428
ADVANCED FLIGHT CONTROL SYSTEM CONCEPTS FOR VTOL AIRCRAFT.
(TRECOM TR69 50)
AD-609 553 DIV. 1

•INTERNATIONAL BUSINESS MACHINES CORP BETHESDA MD

• • •

ERROR CONTROL THROUGH CODING. VOLUME V. ANALYSIS AND COMPARISON OF ERROR CONTROL TECHNIQUES.
(RADC TDR69 149 V5)
AD-609 466 DIV. 8

• • •

ERROR CONTROL THROUGH CODING. VOLUME II. RECURRENT BURST-ERROR-CORRECTING CODES.
(RADC TDR69 149 V2)
AD-609 467 DIV. 8

• • •

ERROR CONTROL THROUGH CODING. VOLUME VI. THE DESIGN OF ERROR CONTROL SYSTEMS.
(RADC TDR69 149 V6)
AD-609 468 DIV. 8

• • •

ERROR CONTROL THROUGH CODING. VOLUME III. VARIABLE REDUNDANCY CODES.
(RADC TDR69 149 V3)
AD-609 470 DIV. 8

• • •

ERROR CONTROL THROUGH CODING. VOLUME I. SUMMARY OF RESULTS.
(RADC TDR69 149 V1)
AD-609 471 DIV. 8

• • •

ERROR CONTROL THROUGH CODING. VOLUME IV. RESIDUE CODES.
(RADC TDR69 149 V4)
AD-609 472 DIV. 8

• • •

ERROR CONTROL THROUGH CODING. VOLUME VII. ADAPTIVE ERROR CONTROL SYSTEMS.
(RADC TDR69 149 V7)
AD-609 473 DIV. 8

• • •

ERROR CONTROL THROUGH CODING. VOLUME VIII. EXPERIMENTAL VERIFICATION AND OTHER STUDIES.
(RADC TDR69 149 V8)
AD-609 474 DIV. 8

•INTERNATIONAL ELECTRIC CORP PARAMUS N J

• • •

IEC TR 90100 4
ON-SITE CATEGORY I PART 1, ACCEPTANCE OF THE DATA DISPLAY CENTRAL GROUP DISPLAY CHAIN, AND CATEGORY II, PART 1, INTEGRATION OF THE DATA DISPLAY CENTRAL GROUP DISPLAY AND REQUEST CHAINS WITH THE ELECTRONIC DATA TRANSMISSION COMMUNICATIONS CENTRAL.
(ESD TDR69 914)
AD-609 773 DIV. 9

• • •

IEC TR 93100 1
ON-SITE CATEGORY I PART 1, ACCEPTANCE OF THE DATA DISPLAY CENTRAL GROUP DISPLAY CHAIN, AND CATEGORY II, PART 1, INTEGRATION OF THE DATA DISPLAY CENTRAL GROUP DISPLAY AND REQUEST CHAINS WITH THE FLECTRONIC DATA TRANSMISSION COMMUNICATIONS GENTRAL.
(ESD TDR69 914)
AD-609 773 DIV. 9

•INTERNATIONAL RESISTANCE CO PHILADELPHIA PA

• • •

PRODUCTION ENGINEERING MEASURES FOR HIGH RELIABILITY, FIXED, FILM, PRECISION RESISTORS.
AD-609 602 DIV. 8

• • •

PRECISION VOLUME RESISTOR.
AD-609 623 DIV. 8

•IONOSPHERE RESEARCH LAB PENNSYLVANIA STATE UNIV UNIVERSITY PARK

• • •

IRL 228
IONOSPHERIC PROCESSES AND NITRIC OXIDE.
(AFCRL 69 948)
AD-609 849 DIV. 2

•ITT INDUSTRIAL LABS FORT WAYNE IND

• • •

ITT 3308
RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES, PHASE II.
AD-609 749 DIV. 8

•J G ENGINEERING RESEARCH ASSOCIATES BALTIMORE MD

• • •

APPROXIMATION TO THE MEAN SQUARE FARFIELD PRESSURE OF RANDOMLY VIBRATING STRUCTURES AT LOW FREQUENCIES.
AD-609 634 DIV. 25

• • •

EFFECT OF EXTERNAL OR INTERNAL STATIC PRESSURE ON THE NATURAL FREQUENCIES OF UNSTIFFENED, CROSS STIFFENED, AND SANDWICH CYLINDRICAL SHELLS.
AD-609 635 DIV. 25

• • •

RANDOM LOADING AND RADIATION FROM STIFFENED AND SANDWICH TYPE CYLINDRICAL SHELL STRUCTURES. PART II, UNSYMMETRICAL LOADING WITH KNOWN SPACE DISTRIBUTION.
AD-609 636 DIV. 25

•LABORATORY FOR ELECTROSCIENCE RESEARCH NEW YORK UNIV N Y

• • •

RESEARCH INVESTIGATIONS IN SYSTEMS THEORY.
(AFOSR 69 2176)
AD-609 490 DIV. 20

• • •

NYU TR 400 100
ON THE REALIZATION OF BINARY SWITCHING FUNCTIONS WITH MAJORITY GATES,
(AFOSR 69 2495)
AD-609 504 DIV. 7

• • •

NYU TR 400 101
AN ALGEBRAIC-GEOMETRIC TECHNIQUE FOR THE REALIZATION OF SWITCHING FUNCTIONS WITH M-OUTOF-N DECISION GATES,
(AFOSR 69 2496)
AD-609 505 DIV. 7

•LEICESTER UNIV (ENGLAND)

• • •

THE EFFECT OF ADDED ELECTROLYTES ON THE E. S. R. AND OPTICAL ABSORPTION OF METAL AMMONIA SOLUTIONS.
(AFOSR 69 2429)
AD-609 557 DIV. 4

•LINCOLN LAB MASS INST OF TECH LEXINGTON

• • •

SOLID STATE RESEARCH.
(ESD TDR69 961)
AD-609 828 DIV. 25

• • •

DIVISION 7. ENGINEERING.
(ESD TDR69 987)
AD-609 872 DIV. 9

• • •

LL 1969 69
ALGORITHMS FOR ESTIMATING A RE-ENTRY BODY'S POSITION, VELOCITY AND BALLISTIC COEFFICIENT IN REAL TIME OR FOR POST FLIGHT ANALYSIS.
(ESD TDR69 983)
AD-609 929 DIV. 12

• • •

LL 1969 1
A LARGE APERTURE SEISMIC ARRAY.
(ESD TDR69 26)
AD-609 891 DIV. 6

•LITTLE (ARTHUR D) INC CAMBRIDGE MASS

• • •

ALI 1501069
OPTIMUM SIGNAL DESIGN AND PROCESSING FOR REVERBERATION, LIMITED ENVIRONMENTS.
AD-609 989 DIV. 6

•LITTON SYSTEMS INC ST PAUL MINN

• • •

LSI 2630 VOL. 1
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES, VOLUME I.
AD-609 805 DIV. 9

• • •

LSI 2631
COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES.
AD-609 804 DIV. 9

• • •

COLLECTIVE PROTECTION FOR COMBAT FIELD STRUCTURES, VOLUME II.
AD-609 806 DIV. 9

•LOCKHEED MISSILES AND SPACE CO HUNTSVILLE ALA HUNTSVILLE RESEARCH AND ENGINEERING

• • •

H 69 017
SOLUTION OF THE INVISCID FLOW DUE TO DISPLACEMENT BY THE METHOD OF INTEGRAL RELATIONS.
AD-609 869 DIV. 9

• • •

LMSC/HREC A710150
SOLUTION OF THE INVISCID FLOW DUE TO DISPLACEMENT BY THE METHOD OF INTEGRAL RELATIONS.
AD-609 869 DIV. 9

•LOCKHEED PROPULSION CO REDLANDS CALIF

• • •

LPC 570 P 5
THERMAL GRAIN STRUCTURAL ANALYSIS.
AD-609 747 DIV. 10

•LOWELL OBSERVATORY FLAGSTAFF ARIZ

• • •

PHYSICAL RESEARCHES ON THE BRIGHTER PLANETS.
(AFCRL 69 926)
AD-609 547 DIV. 2

•MALAKER LABS INC HIGH BRIDGE N J

• • •

KINETIC STUDY OF ROCKET EXHAUST GASES. STUDY OF RADIATION EMITTED BY MODIFIED AND UNMODIFIED PROPELLANT SYSTEM.
AD-609 600 DIV. 10

•MALLORY (P R) AND CO INC INDIANAPOLIS IND

• • •

PRODUCTION ENGINEERING MEASURE FOR IMPROVED RELIABILITY OF SOLID ELECTROLYTE TANTALUM CAPACITORS.
AD-609 707 DIV. 8

•MANLABS INC CAMBRIDGE MASS

• • •

MECHANICAL BEHAVIOR OF INTERMETALLIC COMPOUNDS.
(ASD TDR62 1087 P3)
AD-609 706 DIV. 17

•MAPINE LAB UNIV OF MIAMI CORAL GABLES FLA

• • •

A MODEL OF ATMOSPHERIC REFRACTIVITY AND THEORETICAL HEIGHTS OF RADIO-RADAR RAYS FOR MIAMI, FLORIDA.
AD-609 921 DIV. 8

•MARINE PHYSICAL LAB UNIV OF CALIFORNIA SAN DIEGO

• • •

MPL U 90/69
MANIPULATORS AND SPECIAL DEVICES.
AD-609 490 DIV. 2

• • •

SIO REF 69 16
MANIPULATORS AND SPECIAL DEVICES.
AD-609 490 DIV. 2

*MARTIN MARIETTA CORP DENVER COLO

• • •

CRYOGENIC MATERIALS DATA HANDBOOK,
(ML TDR64 280)
AD-609 562 DIV. 25

• • •

MARTIN R 60 2
AN ANALYTICAL STUDY OF THE EFFECTS OF OBLATENESS ON SATELLITE ORBITS,
AD-609 519 DIV. 12

• • •

WDD M MI 57 53
MANUAL 'FREE' WELDING OF 2014-T6 ALUMINUM.
AD-609 517 DIV. 26

• • •

WDD M MI 58 8
PRELIMINARY EVALUATION OF DIRECT-CURRENT MANUAL WELDING OF 2014-T6 ALUMINUM,
AD-609 514 DIV. 26

• • •

WDD M MI 59 68
EVALUATION OF 6061-T6 TO 2014-T6 AND 6061-T6 TO 6061-T6 ALUMINUM ALLOY WELDS
AD-609 518 DIV. 26

*MARTIN MARIETTA CORP ORLANDO FLA

• • •

OR 2996 1
A METHOD FOR PREDICTING THERMAL RESPONSE IN SANDWICH PANELS.
(ASD TDR63 3061)
AD-609 506 DIV. 13

*MASSACHUSETTS INST OF TECH CAMBRIDGE

• • •

DETERMINATION OF X-RAY SCATTERING FACTORS WITH LIQUID SPECIMENS.
AD-609 603 DIV. 20

• • •

METALLURGICAL ASPECTS OF GAAS-GE HETEROJUNCTIONS.
AD-609 611 DIV. 17

*MCCRONE RESEARCH INST CHICAGO ILL

• • •

DIFFUSION STUDIES IN CERAMIC CRYSTALS.
AD-609 726 DIV. 25

*MCGILL UNIV MONTREAL (QUEBEC)

• • •

AMRG PM 69
HEAT TRANSPORT BY LARGE-SCALE ATMOSPHERIC WAVES DURING OCTOBER 1959-MARCH 1960.
(AFCRL 64 856)
AD-609 803 DIV. 2

*MENTAL HEALTH RESEARCH INST UNIV OF MICHIGAN ANN ARBOR

• • •

STUDIES IN BEHAVIORAL ASPECTS OF GRAMMAR AND SEMANTICS.
(RADC TDR64 196)
AD-609 807 DIV. 28

*METALLURGICAL RESEARCH LABS SYRACUSE UNIV N Y

• • •

MET-E1140 1064 QP3
CRACK INITIATION IN METALLIC MATERIALS.
AD-609 739 DIV. 17

*METRONICS ASSOCIATES INC PALO ALTO CALIF

• • •

METRONICS TR 111
CALCULATION OF EFFICIENCIES OF AEROSOL GENERATING DEVICES FROM FLUX MEASUREMENTS OBTAINED IN FIELD TRIALS.
AD-609 840 DIV. 3

*MICROWAVE ASSOCIATES INC BURLINGTON MASS

• • •

RESEARCH ON MILLIMETER-WAVE GENERATION TECHNIQUES.
(AL TR64 270)
AD-609 629 DIV. 8

• • •

SOLID-STATE GENERATOR.
AD-609 679 DIV. 8

• • •

RUGGEDIZED MICROWAVE DUPLEXING TUBES: PRODUCTION ENGINEERING MEASURES PROGRAM.
AD-609 761 DIV. 8

*MICROWAVE LAB STANFORD UNIV CALIF

• • •

A STUDY OF THE PLASMA BOUNDARY.
(ARL 64 138)
AD-609 567 DIV. 25

*MIDWEST RESEARCH INST KANSAS CITY MO

• • •

THE STRUCTURE AND STRENGTH OF EPITAXIAL FILMS.
AD-609 730 DIV. 25

*MINNESOTA UNIV MINNEAPOLIS

• • •

AN IMBEDDING OF CLOSED RIEMANN SURFACES IN EUCLIDEAN SPACE,
(AFOSR TN60 1266)
AD-609 866 DIV. 15

*MITRE CORP BEDFORD MASS

• • •

PROCEEDINGS OF THE TROPOSPHERIC REFRACTION EFFECTS MEETING (NO. 3). VOLUME I. RESULTS AND STATUS OF TROPOSPHERIC-EFFECTS MEASUREMENT PROGRAM.
(ESD TDR64 148 V1)
AD-609 731 DIV. 8

• • •

MITRE SR 123
SYSTEM INSTALLATION AND TESTING,
(ESD TDR64 167)
AD-609 477 DIV. 18

• • •

MITRE SR 125
THE ROLE OF SIMULATION AND DATA REDUCTION PROGRAMS IN THE DEVELOPMENT OF REAL-TIME SYSTEMS.
(ESD TDR64 169)
AD-609 900 DIV. 30

• • •

MITRE TM 4073
VULNERABILITY OF MANNED ORBITAL COMMAND POSTS TO NATURAL SPACE RADIATIONS,
(ESD TDR64 164)
AD-609 901 DIV. 12

• • •

TM 03903
THE MINIMUM NUMBER OF LINEAR DECISION FUNCTIONS TO IMPLEMENT A DECISION PROCESS
(ESD TDR64 171)
AD-609 476 DIV. 15

• • •

TM 04093/0000/00/0/00
THE EFFECTS OF MISMATCH AND DISTORTION ON THE OUTPUT SIGNAL OF A LINEAR FM PULSE-COMPRESSION FILTER,
(ESD TDR64 149)
AD-609 478 DIV. 8

• • •

M 06390/0000/01/1/00
EFFICIENCY OF A ROUTING SCHEME IN A MOBILE DATA PROCESSING COMMUNICATION NETWORK,
(ESD TDR64 695)
AD-609 774 DIV. 8

• • •

M 07106/0000/00/0/00
ORBITAL FLIGHT AND COVERAGE SIMULATION,
(ESD TDR64 156)
AD-609 502 DIV. 12

*MONSANTO RESEARCH CORP DAYTON OHIO

• • •

STUDIES OF LOW-TEMPERATURE OXIDATION REACTIONS.
AD-609 800 DIV. 4

*MONSANTO RESEARCH CORP EVERETT MASS

• • •

MRB3000902
CHEMILUMINESCENT SYSTEMS.
AD-609 609 DIV. 4

*MONTEK DIV MODEL ENGINEERING AND MFG CORP SALT LAKE CITY UTAH

• • •

MONTEK 63 234
SOLID STATE TACAN.
(ESD TDR64 948)
AD-609 810 DIV. 19

*MOTOROLA INC PHOENIX ARIZ

• • •

ELECTRONIC PARTS-ACCELERATED LIFE TESTS.
(RADC TDR64 142)
AD-609 808 DIV. 8

*NARMCO RESEARCH AND DEVELOPMENT DIV WHITTAKER CORP SAN DIEGO CALIF

• • •

OPTIMUM FILAMENT DIAMETER.
(AD 605 552 SUPPL.)
AD-609 699 DIV. 31

*NATIONAL BUREAU OF STANDARDS WASHINGTON D C

• • •

8594
FLUOROCARBON POLYMERS. PERFLUOROPOLYTOLYLENES,
AD-609 998 DIV. 4

*NAVAL AIR STATION PENSACOLA FLA MATERIALS ENGINEERING DIV

• • •

0A27 64
TRECOM TECHNICAL REPORT 63-55; REVIEW OF.
AD-609 743 DIV. 27

*NAVAL AIR STATION PENSACOLA FLA MATERIALS ENGINEERING DIV

• • •

0A20 64
EFFECTIVENESS OF THE SPECTROMETRIC OIL ANALYSIS METHOD FOR MONITORING AIRCRAFT MECHANISMS.
AD-609 746 DIV. 27

*NAVAL AMMUNITION DEPOT CRANE IND

• • •

RDTR49
THE DEVELOPMENT AND EVALUATION OF POLYSTYRENE FOAM CONTAINER FOR MK 66 TYPE SUBMARINE SIGNALS
AD-609 647 DIV. 26

*NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF

• • •

N563
MIGRATION OF FUSED FALLOUT SIMULANT INTO SOILS,
AD-609 645 DIV. 20

*NAVAL ORDNANCE LAB WHITE OAK MD

• • •

TR64 196
INITIATION OF EXPLOSIVES BY EXPLODING WIRES. V. EFFECT OF WIRE MATERIAL ON THE INITIATION OF PETN BY EXPLODING WIRES
AD-609 949 DIV. 22

*NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF

• • •

TP3452;
THE LCU 1996 MOBILE TEST FACILITY.
(NAVWEPS 8489)
AD-609 878 DIV. 22

• • •

TP3959
MORRIS DAM PROPULSION LABORATORY.
AD-609 819 DIV. 27

• • •

TP3960
MORRIS DAM BALLISTIC RANGE.
AD-609 822 DIV. 30

• • •

TP3961
YFU-49 DEEP DEPTH TEST FACILITY.
AD-609 823 DIV. 30

• • •

TP3962
LONG BEACH SEA RANGE.
AD-609 824 DIV. 30

*NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF

• • •
TABLE OF THE DEBYE FUNCTIONS
AD-609 702 DIV. 25

•NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF
• • •
THE DESIGN AND PERFORMANCE OF A FALLOUTTESTED MANNED SHELTER STATION AND ITS SUITABILITY AS A SINGLE-FAMILY SHELTER (USNRDL TR647)
AD-609 734 DIV. 18

•NAVAL RESEARCH LAB WASHINGTON D C
• • •
REPORT OF NRL PROGRESS.
(PB 181 568)
AD-609 535 DIV. 30
• • •
A NAVY ANALYSIS OF GLASS REINFORCED PLASTICS FOR HYDROSPACE APPLICATIONS,
AD-609 708 DIV. 14
• • •
6105
CORROSION OF METALS IN TROPICAL ENVIRONMENTS. PART 6. ALUMINUM AND MAGNESIUM.
AD-609 618 DIV. 17
• • •
6161
FILAMENT-WINDING PLASTICS. PART 2. ROLE OF THE RESIN IN GLASS-FIBER-REINFORCED STRUCTURES UNDER TENSILE STRESS
AD-609 770 DIV. 14
• • •
6169
FIRST ORDER OBLATENESS PERTURBATIONS AND THE U. S. NAVAL SPACE SURVEILLANCE SYSTEM.
AD-609 566 DIV. 6
• • •
6174
DIGITAL COMPUTER STUDIES OF ELECTRON GUNS.
AD-609 679 DIV. 8
• • •
6175
MODIFICATION OF THE RINGROSE CARBON DIOXIDE METER,
AD-609 881 DIV. 31
• • •
6179
YANKEE REACTOR PRESSURE VESSEL SURVEILLANCE: EVALUATION OF SPECIMENS EXPOSED DURING THE SECOND CORE,
AD-609 569 DIV. 20
• • •
6189
THE STABILIZATION OF MONOETHANOLAMINE SOLUTIONS FOR SUBMARINE CARBON DIOXIDE SCRUBBERS.
AD-609 888 DIV. 31
• • •
6221
DIFFUSION IN COLUMBIUM RICH COLUMBIUMTITANIUM ALLOYS WITH CONSIDERATION OF THE POSSIBILITY THAT THE DIFFUSION COEFFICIENT IS TIME DEPENDENT.
AD-609 870 DIV. 17

•NAVAL SCHOOL OF AVIATION MEDICINE PENSACOLA FLA
• • •
COMPARATIVE HISTOLOGICAL STUDY OF THE REINFORCED AREA OF THE SACCULAR MEMBRANE IN MAMMALS.
AD-609 443 DIV. 16
• • •
QUANTITATIVE INTERPRETATION OF THE EXERCISE ELECTROCARDIOGRAM. USE OF COMPUTER TECHNIQUES IN THE CARDIAC EVALUATION OF AVIATION PERSONNEL.
AD-609 444 DIV. 16
• • •
AN INVESTIGATION OF UNPREDICTED DIFFERENCES IN ATTRITION RATES AMONG STUDENTS FROM DIFFERENT PROCUREMENT SOURCES.
AD-609 668 DIV. 23

•NAVAL WEAPONS LAB DAHLGREN VA
• • •
1918
LOCAL BOUNDARY LAYER APPROXIMATIONS OF REGULAR FLOWS PAST A SEMI-INFINITE PLATE,
AD-609 599 DIV. 9

•NAVY MEDICAL NEUROPSYCHIATRIC RESEARCH UNIT SAN DIEGO CALIF
• • •
64 13
COMPATIBILITY AMONG WORK ASSOCIATES IN ISOLATED GROUPS
AD-609 544 DIV. 28
• • •
64 19
PERFORMANCE EVALUATIONS OF ANTARCTIC VOLUNTEERS,
AD-609 546 DIV. 28
• • •
64 22
PERSONAL HISTORY CORRELATES OF MILITARY PERFORMANCE AT A LARGE ANTARCTIC STATION
AD-609 542 DIV. 28
• • •
64 23
VARIABILITY IN FACTOR STRUCTURES OF CLINICIANS' PERSONALITY RATINGS,
AD-609 545 DIV. 28
• • •
64 24
STRUCTURAL CHANGE IN SMALL ISOLATED GROUPS,
AD-609 543 DIV. 28

•NEW MEXICO UNIV ALBUQUERQUE ENGINEERING EXPERIMENT STATION
• • •
ME 10
STUDY OF DISLOCATION FAILURE PHENOMENA IN UNIFORM RADIAL AND TENSILE FIELDS (AFOSR 64 1715)
AD-609 855 DIV. 29

•NEW YORK STATE COLL OF AGRICULTURE CORNELL UNIV ITHACA
• • •
BU 166 M
NOTE ON REPEATED SELECTION IN THE NORMAL CASE.
AD-609 464 DIV. 32
• • •
BU 170 M
ON THE PROBABILITY DISTRIBUTION OF X MODULO N.
AD-609 465 DIV. 32

•NORTH AMERICAN AVIATION INC LOS ANGELES CALIF
• • •
NA 64 527
MOMENTS OF INERTIA AND CENTERS OF GRAVITY OF THE LIVING HUMAN BODY ENCUMBERED BY A FULL-PRESSURE SUIT. (AMRL TR64 110)
AD-609 863 DIV. 16

•NORTHEASTERN UNIV BOSTON MASS
• • •
INVESTIGATION OF SOLID STATE DEVICES AND CIRCUITS. (AFCRL 64 902)
AD-609 674 DIV. 8

•OFFICE OF AEROSPACE RESEARCH WASHINGTON D C
• • •
U. S. AIR FORCE ACHIEVEMENTS IN RESEARCH.
AD-609 830 DIV. 30

•OFFICE OF NAVAL RESEARCH WASHINGTON D C
• • •
18
ONR POLICY ON RESEARCH
AD-609 646 DIV. 30

•OHIO STATE UNIV COLUMBUS RESEARCH FOUNDATION
• • •
RESEARCH ON RADIOGRAPHIC TECHNIQUES OF GRAPHITE EVALUATION. (ML TDR64 277)
AD-609 877 DIV. 30

•OPTICS TECHNOLOGY INC BELMONT CALIF
• • •
LONG WAVELENGTH INFRARED FIBER OPTICS.
AD-609 842 DIV. 14

•PARAMETRICS INC WALTHAM MASS
• • •
CHEMICAL-ELECTRICAL SENSING. (RADC TDR64 388)
AD-609 721 DIV. 9

•PARKE MATHEMATICAL LABS INC CARLISLE MASS
• • •
TOROIDAL WAVE FUNCTIONS AND THEIR APPLICATION TO THE FREE-FLOODING RING TRANSDUCER.
AD-609 529 DIV. 25

•PENNSYLVANIA HOSPITAL PHILADELPHIA UNIT FOR EXPERIMENTAL PSYCHIATRY
• • •
PSYCHOLOGICAL CORRELATES OF PLATEAU HYPNOTIZABILITY IN A SPECIAL VOLUNTEER SAMPLE. (AFOSR 64 2499)
AD-609 713 DIV. 28

•PENNSYLVANIA STATE UNIV UNIVERSITY PARK
• • •
FIELD ION MICROSCOPY OF IRON WHISKERS. (ML TR64 346)
AD-609 859 DIV. 17

•PENNSYLVANIA UNIV PHILADELPHIA
• • •
A PROBABILITY DENSITY COMMON TO MOLECULAR FIELD AND COLLECTIVE EXCITATION THEORIES OF FERROMAGNETISM.
AD-609 552 DIV. 25

•PICKARD AND BURNS ELECTRONICS DIV GORHAM CORP WALTHAM MASS
• • •
PANDB 916
ATOMIC OSCILLATOR DEVICE FOR NAVIGATIONGUIDANCE.
AD-609 776 DIV. 8

•PIEZO CRYSTAL CO CARLISLE PA
• • •
PEM QUARTZ CRYSTAL UNITS, FILTER LOW FREQUENCY, 1MC TO 10MC TYPES CR-(XM-49)/U THRU CR-(XM-52)/U.
AD-609 463 DIV. 8

•PITTSBURGH UNIV PA
• • •
AN EVALUATION OF MULTIPLE TRACKS IN A LINEAR PROGRAM. (AMRL TR64 108)
AD-609 801 DIV. 23
• • •
LEARNING SET FORMATION IN PROGRAMMED INSTRUCTION. (AMRL TR64 114)
AD-609 802 DIV. 23

•PLASMADYNE CORP SANTA ANA CALIF
• • •
FR113 1149
A FUNDAMENTAL THEORETICAL AND EXPERIMENTAL STUDY OF ROTARY MAGNETOHYDRODYNAMICS (AFOSR 64 2475)
AD-609 812 DIV. 25

•POLYTECHNIC INST OF BROOKLYN N Y
• • •
THERMOELECTRIC POWER OF THE TRANSITION METAL DIBORIDES.
AD-609 816 DIV. 25
• • •
PIBAL 811
FURTHER SIMILARITY SOLUTIONS OF WAKES AND JETS. PART I. TWO-DIMENSIONAL FLOWS. PART II. AXISYMMETRIC FLOWS, (AFOSR 64 1944)
AD-609 576 DIV. 9
• • •
PIBAL 831
REVIEW OF THEORETICAL INVESTIGATIONS ON THE EFFECT OF HEAT TRANSFER ON LAMINAR SEPARATION, (AFOSR 64 1658)
AD-609 575 DIV. 9
• • •
PIBAL 848
LINEARIZED ANALYSIS OF UNSTEADY, REACTING FLOWS WITH BODY FORCES, (AFOSR 64 1873)
AD-609 574 DIV. 9

•POULTER RESEARCH LABS STANFORD RESEARCH INST MENLO PARK CALIF

• • •
ACOUSTIC ADMITTANCE OF BURNING SOLID PROPELLANT SURFACE.
AD-609 889 DIV. 10

•PRINCETON UNIV N J
• • •
ANALYTICAL-EXPERIMENTAL CORRELATION OF RADIATION LOSS FROM AN ARGON ARCJET.
(ARL 64 172)
AD-609 722 DIV. 25

•PROTEUS INC WHIPPANY N J
• • •
PROPERTIES OF BUOYANT MATERIALS AND STRUCTURES.
AD-609 821 DIV. 14

•PURDUE UNIV LAFAYETTE IND SCHOOL OF ELECTRICAL ENGINEERING
• • •
PUSEE TR EE64 18
THE BORN APPROXIMATION APPLIED TO ELECTROMAGNETIC SCATTERING FROM A FINITE CONE.
(AFCRL 64 762)
AD-609 724 DIV. 25

•PURDUE UNIV LAFAYETTE IND
• • •
RESEARCH IN NITROMONOMERS AND THEIR APPLICATION TO SOLID SMOKELESS PROPELLANTS.
AD-609 852 DIV. 10

•QUANTUM ELECTRONICS LAB CALIF INST OF TECH PASADENA
• • •
AN ANALYSIS OF PERTURBED CONFOCAL RESONATORS.
(AFOSR 64 2074)
AD-609 769 DIV. 25

•QUEENS COLL FLUSHING N Y
• • •
A LATENT STRUCTURE FOR THE SIMPLEX,
AD-609 676 DIV. 28

•RADIO CORP OF AMERICA HARRISON N J
• • •
A LOW-NOISE, MULTIPLE-FUNCTION, X-BAND TRAVELING-WAVE TUBE.
AD-609 572 DIV. 8

•RADIO CORP OF AMERICA SOMERVILLE N J
• • •
DEVELOPMENT OF A UHF POWER TRANSISTOR.
AD-609 626 DIV. 8

•RAND CORP SANTA MONICA CALIF
• • •
P 2422
THE AUTOMOBILE-TODAY AND TOMORROW,
AD-609 753 DIV. 11
• • •
P 2625
ANALYSIS OF SOME LAND TRANSPORTATION VEHICLES, TODAY AND TOMORROW,
AD-609 754 DIV. 11
• • •
P 2651
MODELS OF URBAN CHANGE: THEIR ROLE IN URBAN TRANSPORTATION RESEARCH,
AD-609 755 DIV. 33
• • •
P 2938
GANEFO I: SPORTS AND POLITICS IN DJAKARTA,
AD-609 659 DIV. 32
• • •
P 3001 I
TRANSIENT RESPONSE OF A RIGID SPHERICAL INCLUSION IN AN ELASTIC MEDIUM,
AD-609 850 DIV. 25
• • •
P 3030
AFRICAN STUDIES AND ECONOMIC ANALYSIS,
AD-609 680 DIV. 32
• • •
P 3035
NATIONAL PRIORITIES AND DEVELOPMENT STRATEGIES IN SOUTHEAST ASIA,
AD-609 660 DIV. 32
• • •
P 3036
APPLICATIONS OF A DIGITAL-COMPUTER SIMULATION OF A NEURAL NETWORK,
AD-609 681 DIV. 30
• • •
P 3041
INFLUENCES OF SMALL DIFFERENCES IN BALLISTIC COEFFICIENT OF SATELLITE STATION KEEPING
AD-609 880 DIV. 12
• • •
P 3042
NOTES ON THE BEGINNINGS OF MODERN METEORITICS,
AD-609 879 DIV. 2
• • •
RM 2800 1 SUPPL.
ECONOMICS DEPARTMENT PUBLICATIONS, 1959-1964: AN AUTHOR INDEX OF THE OPEN LITERATURE, WITH ABSTRACTS.
AD-609 873 DIV. 32
• • •
RM 2824 FF
TRANSPORTATION FOR FUTURE URBAN COMMUNITIES: A STUDY PROSPECTUS.
AD-609 756 DIV. 33
• • •
RM 2878 FF
A FIRST APPROXIMATION TO A RAND MODEL FOR STUDY OF URBAN TRANSPORTATION,
AD-609 771 DIV. 33
• • •
RM 2922 FF
AUTOMOBILES: TODAY AND TOMORROW,
AD-609 757 DIV. 11
• • •
RM 3086 FF
A MULTIPLE EQUATION MODEL OF HOUSEHOLD LOCATIONAL AND TRIPMAKING BEHAVIOR,
AD-609 758 DIV. 33
• • •
RM 4248 PR
VALUES OF LARGE GAMES-VII: A GENERAL EXCHANGE ECONOMY WITH MONEY,
AD-609 648 DIV. 32
• • •
RM 4323 PR
ASSESSING THE IMPACT OF WEAPON SYSTEM MODIFICATIONS BY FIELD STUDY: A FEASIBILITY DEMONSTRATION.
AD-609 791 DIV. 18
• • •
RM 4324 PR
PRODUCT IMPROVEMENT CANDIDATE SELECTION AND MANAGEMENT INFORMATION.
AD-609 793 DIV. 18
• • •
RM 4329 PR
A DYNAMIC PROGRAMMING APPROACH TO THE NONPARAMETRIC PROBLEM IN THE CALCULUS OF VARIATIONS,
AD-609 649 DIV. 15
• • •
RM 4364 PR
CHANGES IN THE CHEMICAL COMPOSITION OF THE ATMOSPHERE FOLLOWING INTENSE IONIZATION IMPULSES.
AD-609 792 DIV. 2
• • •
RM 4378 NIH
NUMERICAL INTEGRATION OF A DIFFERENTIALDIFFERENCE EQUATION WITH A DECREASING TIMELAG,
AD-609 835 DIV. 19
• • •
RM 4404 PR
THE THERMODYNAMICS OF THE POLYAMIDE RESIN (NYLON-6): CARBON-HYDROGEN-OXYGEN NITROGEN VAPOR SYSTEM.
AD-609 882 DIV. 14
• • •
T 112
WHY THE USA IS STRAINING TO GET INTO OUTER SPACE,
(TT 59 10984)
AD-609 585 DIV. 18

•RAYTHEON CO NORWOOD MASS
• • •
INVESTIGATIONS OF ELECTRICAL CHARACTERISTICS OF THE SUBSURFACE ROCK MEDIUM IN ESSEX COUNTY, NEW YORK.
(AFCRL 64 731)
AD-609 683 DIV. 2
• • •
CONDUCTIVITY MEASUREMENTS IN DISSIPATIVE MEDIA WITH ELECTRICALLY SHORT PROBES.
(AFCRL 64 848)
AD-609 684 DIV. 2
• • •
VERTICAL ELECTRIC DIPOLE IN A TWO CONDUCTOR REGION.
(AFCRL 64 730)
AD-609 685 DIV. 2

•RCA DEFENSE ELECTRONIC PRODUCTS PRINCETON N J
• • •
RESEARCH AND DEVELOPMENT ON PHOTOCONDUCTIVE PHOTOTAPE.
AD-609 768 DIV. 24

•RCA LABS DIV RADIO CORP OF AMERICA PRINCETON N J
• • •
COMPATIBLE ACTIVE THIN-FILM INTEGRATED STRUCTURES.
(AL TR64 291)
AD-609 461 DIV. 8
• • •
CRYOELECTRIC RANDOM ACCESS MEMORY, PHASE II 1010 BIT MEMORY.
(RADC TDR64 376)
AD-609 469 DIV. 30
• • •
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
(AFCRL 64 894)
AD-609 705 DIV. 8
• • •
THEORY OF ADJUSTABLE SWITCHING NETWORKS.
(AFCRL 64 893)
AD-609 745 DIV. 8

•RCA SERVICE CO INC CAMDEN N J
• • •
TECHNIQUES OF PHYSIOLOGICAL MONITORING. VOLUME III. SYSTEMS.
AD-609 481 DIV. 16

•REDSTONE SCIENTIFIC INFORMATION CENTER REDSTONE ARSENAL ALA
• • •
178:
A 'COMPLETE IDIOT WITH SPECIAL TALENT' FOR THE TROOPS.
(TT 64 15688)
AD-609 620 DIV. 30
• • •
333:
ON THE STEADY STATE OF IONIZATION IN WEAKLY IONIZED PLASMA IN THE NON-EQUILIBRIUM STATE,
(TT 65 60473)
AD-609 439 DIV. 28
• • •
343:
THEORY OF ERROR OF THE RUNGE-KUTTA METHOD,
(TT 65 60557)
AD-609 656 DIV. 19
• • •
344:
PETROGRAPHIC INVESTIGATION OF THE LUNAR SURFACE BY JOINT USE OF PHOTOMETRIC AND COLORIMETRIC OBSERVATIONS,
(TT 65 60567)
AD-609 693 DIV. 2
• • •
354
MANAGEMENT OF THE RDT AND E CYCLE.
AD-609 539 DIV. 13

•REDSTONE SCIENTIFIC INORMATION CENTER REDSTONE ARSENAL ALA
• • •
341:
RUNGE-KUTTA TYPE PROCEDURES OF ORDER OF ACCURACY N + 4 (N>2) WITH THREE NODES FOR NUMERICAL INTEGRATION OF FIRST-ORDER DIFFERENTIAL EQUATIONS
(TT 65 60566)
AD-609 692 DIV. 19

*RENSSELAER POLYTECHNIC INST
TROY N Y

COMPARISON OF EXTENDED POLYETHYLENE AND CHRYSOTILE ASBESTOS FRACTURE SURFACES.
AD-609 608 DIV. 14

INVESTIGATION OF THE FUNDAMENTAL ELECTROCHEMICAL PARAMETERS INFLUENCING FUEL CELL PERFORMANCE.
(AFCRL 64 793)
AD-609 718 DIV. 7

*REPUBLIC AVIATION CORP FARMINGDALE N Y

RESEARCH DEVELOPMENT AND TEST OF REFRACTORY METAL ALLOY FASTENERS.
(FDL TDR64 113)
AD-609 653 DIV. 26

*RESEARCH AND ADVANCED DEVELOPMENT DIV AVCO CORP WILMINGTON MASS

RAD TR 59 9
CALIBRATION OF A PLASMA JET FACILITY FOR SIMULATION OF BALLISTIC MISSILE RE-ENTRY
AD-609 593 DIV. 12

RAD 9 TM 59 69
ON STABILITY CRITERIA OF EXPLICIT DIFFERENCE SCHEMES FOR CERTAIN HEAT CONDUCTION PROBLEMS WITH UNCOMMON BOUNDARY CONDITIONS.
(AFBMD TN59 23)
AD-609 738 DIV. 25

*RESEARCH AND TECHNOLOGY DIV AIR FORCE SYSTEMS COMMAND WASHINGTON D C

TDR63 4044 P2
PRESSURE MEASUREMENTS FOR MACH 8 FLOWS OVER EXPANSION CORNERS AND RAMPS ON AN INTERNALLY COOLED MODEL. PART II. FLOWS OVER A FLAT PLATE WITH AND WITHOUT A PARTIAL SPAN RAMP. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS.
AD-609 458 DIV. 9

*RHODE ISLAND UNIV KINGSTON

COMMUNICATION CHARACTERISTICS OF AN UNDERWATER ACOUSTIC SIGNAL REFLECTED FROM A SPACE AND TIME RANDOM SURFACE.
AD-609 627 DIV. 5

*ROCHESTER UNIV N Y

INFRARED SPECTRA OF METAPHOSPHATE GLASSES.
AD-609 606 DIV. 14

*ROCKET PROPULSION LAB AIR FORCE SYSTEMS COMMAND EDWARDS CALIF

TR64 183
CASTABLE CARBON FOR NOZZLE APPLICATIONS.
AD-609 607 DIV. 27

*ROCKET PROPULSION LAB AIR FORCE SYSTEMS COMMAND EDWARDS CALIF

TDR64 123
APPLICATION OF RADIOISOTOPE LIQUID LEVEL GAGES AT THE AIR FORCE ROCKET PROPULSION LABORATORY.
AD-609 836 DIV. 27

*ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y

TDR64 142
ELECTRONIC PARTS-ACCELERATED LIFE TESTS.
AD-609 808 DIV. 8

TDR64 146
STUDIES IN BEHAVIORAL ASPECTS OF GRAMMAR AND SEMANTICS.
AD-609 807 DIV. 28

TDR64 149 V1
ERROR CONTROL THROUGH CODING. VOLUME I. SUMMARY OF RESULTS.
AD-609 471 DIV. 8

TDR64 149 V2
ERROR CONTROL THROUGH CODING. VOLUME II. RECURRENT BURST-ERROR-CORRECTING CODES.
AD-609 467 DIV. 8

TDR64 149 V3
ERROR CONTROL THROUGH CODING. VOLUME III. VARIABLE REDUNDANCY CODES.
AD-609 470 DIV. 8

TDR64 149 V4
ERROR CONTROL THROUGH CODING. VOLUME IV. RESIDUE CODES.
AD-609 472 DIV. 8

TDR64 149 V5
ERROR CONTROL THROUGH CODING. VOLUME V. ANALYSIS AND COMPARISON OF ERROR CONTROL TECHNIQUES.
AD-609 466 DIV. 8

TDR64 149 V6
ERROR CONTROL THROUGH CODING. VOLUME VI. THE DESIGN OF ERROR CONTROL SYSTEMS.
AD-609 468 DIV. 8

TDR64 149 V7
ERROR CONTROL THROUGH CODING. VOLUME VII. ADAPTIVE ERROR CONTROL SYSTEMS.
AD-609 473 DIV. 8

TDR64 149 V8
ERROR CONTROL THROUGH CODING. VOLUME VIII. EXPERIMENTAL VERIFICATION AND OTHER STUDIES.
AD-609 474 DIV. 8

TDR64 316
BRIDGED 'T' EXTENSION.
AD-609 475 DIV. 8

TDR64 318 V1
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME I. SYSTEM DESCRIPTION AND ANALYSIS.
AD-609 790 DIV. 12

TDR64 318 V2
FEASIBILITY STUDY FOR A VEHICLE ATTITUDE DETERMINING SYSTEM. VOLUME II. DETAILED ANALYSIS OF ANTENNAS, PROPAGATION, POLARIZATION, AND PERFORMANCE.
AD-609 791 DIV. 12

TDR64 336
AN/FPA-22(XN-1), AN/FPA-22(XN-1), L/UHF-BAND PENCIL BEAM RADARS.
AD-609 633 DIV. 6

TDR64 360
EXPERIMENTAL RESEARCH INVESTIGATION OF EXTREMELY LOW FREQUENCY PROPAGATION.
AD-609 719 DIV. 8

TDR64 376
CRYOELECTRIC RANDOM ACCESS MEMORY, PHASE II 10(9) BIT MEMORY.
AD-609 469 DIV. 30

TDR64 389
SEMICONDUCTOR LASER AMPLIFIER TECHNIQUES (SEMLAM).
AD-609 709 DIV. 25

TDR64 388
CHEMICAL-ELECTRICAL SENSING.
AD-609 721 DIV. 4

TDR64 393
THE TRW TWO-STATION, ON-LINE SCIENTIFIC COMPUTER.
AD-609 720 DIV. 30

TDR64 428
MODIFICATIONS MADE TO THE USAF TRANSPORTABLE PASSIVE SATELLITE COMMUNICATIONS TERMINAL.
AD-609 809 DIV. 8

TDR64 434
MULTIPLE TAPPED PHOTOELASTIC DELAY LINE.
AD-609 579 DIV. 25

TDR64 461
PROJECT WIDE BAND.
AD-609 619 DIV. 6

*ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y

EME TM 64 4
CONCEPTS RELATIVE TO SYSTEM EFFECTIVENESS.
AD-609 627 DIV. 30

TDR64 70
FAST HIGH POWER MICROWAVE SWITCHES. A SURVEY.
AD-609 659 DIV. 8

*SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA

SIO REF 64 11
GENERAL OCEANOGRAPHY AND LONG RANGE RESEARCH.
AD-609 854 DIV. 2

*SKF INDUSTRIES INC PHILADELPHIA PA

AL64T067
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
AD-609 437 DIV. 14

*SOUTHERN RESEARCH INST BIRMINGHAM ALA

SRIB 9737 1084 XIII
A STUDY OF THE DIFFUSIVITY OF IRON IN LIQUID SLAGS.
(AFOSR 4493)
AD-609 459 DIV. 17

*SPACE SCIENCES LAB GENERAL ELECTRIC CO PHILADELPHIA PA

R64SD76
INDUCTIVE PLASMA HEATING USING A MULTITURN COIL.
AD-609 834 DIV. 25

R64SD77
CHOICE OF AN APPROPRIATE MEAN ABSORPTION COEFFICIENT FOR USE IN THE GENERAL GREY GAS EQUATIONS.
AD-609 838 DIV. 25

R64SD78
DISTORTED WAVE CALCULATION OF ROTATIONAL EXCITATION OF N2 BY SLOW ELECTRONS.
AD-609 837 DIV. 25

R64SD91
SPACE PROPULSION BY PLASMA ACCELERATION TECHNIQUES.
AD-609 833 DIV. 27

*SPACE SCIENCES LAB LITTON SYSTEMS INC BEVERLEY HILLS CALIF

SSL(LSI) PUB 3484
RESEARCH ON ELECTROMAGNETIC PLASMA ACCELERATION.
(AFOSR 64 1340)
AD-609 482 DIV. 25

*SPACE SYSTEMS DIV AIR FORCE SYSTEMS COMMAND INGLEWOOD CALIF

TDR63 48
ELECTRONICS RESEARCH PROGRAM. RESEARCH AND EXPERIMENTATION ON SPACE APPLICATIONS OF MILLIMETER WAVES.
AD-609 594 DIV. 8

*SPACELABS INC VAN NUYS CALIF

SPACELABS SR 64 1014 (7200)
DYNAMIC MEASUREMENTS OF PROTECTIVE MASKS.
AD-609 982 DIV. 5

*SPACES SCIENCES LAB GENERAL ELECTRIC CO PHILADELPHIA PA

• • •
RESEARCH ON HYPERSONIC RAREFIED PLASMA FLOWS.
(AFOSR 69 2471)
AD-609 496 DIV. 9

•SPACE-GENERAL CORP EL MONTE CALIF
• • •
SGC 491R 1
EXPERIMENTAL RESEARCH INVESTIGATION OF EXTREMELY LOW FREQUENCY PROPAGATION.
(RADC TDR69 360)
AD-609 719 DIV. 8

•SPECIAL OPERATIONS RESEARCH OFFICE AMERICAN UNIV WASHINGTON D C
• • •
U. S. ARMY AREA HANDBOOK FOR BRAZIL.
(DA PAM550 20)
AD-609 983 DIV. 18

•SPERRY MICROWAVE ELECTRONICS CO CLEARWATER FLA
• • •
SJ222 0045 5
PRODUCTION ENGINEERING MEASURE. YIG SPHERES AND LIMITERS.
AD-609 661 DIV. 8

•STANFORD ELECTRONICS LABS STANFORD UNIV CALIF
• • •
SEL TR 1807 7
A FIXED-VOLTAGE POWER SUPPLY FOR TRANSISTOR CIRCUITS.
(AL TR69 269)
AD-609 947 DIV. 8
• • •
SEL 69 096
A FIXED-VOLTAGE POWER SUPPLY FOR TRANSISTOR CIRCUITS.
(AL TR69 269)
AD-609 947 DIV. 8

•STANFORD RESEARCH INST MENLO PARK CALIF
• • •
STRESS PROPAGATION IN SOILS.
(DASA 1266 9)
AD-609 955 DIV. 2
• • •
THE ROLE OF ALUMINUM AND ITS OXIDES IN SOLID PROPEL LANTS.
AD-609 991 DIV. 10
• • •
DESIGN APPROACHES FOR SATELLITE ANTENNAS.
(N63 14955)
AD-609 616 DIV. 8
• • •
ANALYSIS OF DAYTIME RADIATION DATA FROM TIROS IV.
(AFCRL 69 905)
AD-609 767 DIV. 2
• • •
THE STUDY OF THE ORIGIN AND PROPAGATION OF DISTURBANCES IN THE BURNING OF SOLID PROPEL LANTS.
AD-609 886 DIV. 10
• • •
THE STUDY OF THE ORIGIN AND PROPAGATION OF DISTURBANCES IN THE BURNING OF SOLID PROPEL LANTS.
AD-609 887 DIV. 10

•STANFORD UNIV CALIF
• • •
PREFERENCE, CREDENCE, AND UTILITY.
(AFOSR 69 2498)
AD-609 960 DIV. 19

•STRATHCLYDE UNIV GLASGOW (SCOTLAND) CHEMISTRY DEPT
• • •
FINAL REPORT THE REACTIONS OF INORGANIC COMPOUNDS IN NON-AQUEOUS SOLVENTS .
AD-609 712 DIV. 4

•SYLVANIA ELECTRIC PRODUCTS INC BUFFALO N Y
• • •
MODIFICATIONS MADE TO THE USAF TRANSPORTABLE PASSIVE SATELLITE COMMUNICATIONS TERMINAL.
(RADC TDR69 428)
AD-609 809 DIV. 8

•SYSTEMS INC ORLANDO FLA
• • •
PEM FOR FILTERS, UPPER SIDEBAND (1.79 MC.) QUARTZ CRYSTALS TYPE EL-FR (X-1).
AD-609 716 DIV. 8

•SYSTEMS RESEARCH CENTER CASE INST OF TECH CLEVELAND OHIO
• • •
SRC 49 A 69 16
A HEURISTIC APPROACH TO SOLUTION OF CHECKERBOARD PUZZLES,
(AFOSR 69 2406)
AD-609 570 DIV. 30

•TECHNICAL OPERATIONS RESEARCH BURLINGTON MASS
• • •
TO B 69 15
THE INVESTIGATION OF PASSIVE LASER QSWITCHING.
AD-609 643 DIV. 25

•TECHNOLOGY INC DAYTON OHIO
• • •
DESIGN AND OPERATION OF A SPACE RENDEZVOUS SIMULATOR.
(APL TR69 130)
AD-609 748 DIV. 12

•TEXAS A AND M UNIV COLLEGE STATION
• • •
TAMU REF 69 19T
THE MARINE ICHTHYOFAUNA OF ST. ANDREW BAY, FLORIDA, AND NEARSHORE HABITATS OF THE NORTHEASTERN GULF OF MEXICO
AD-609 715 DIV. 2
• • •
TAMU REF 69 26T
NORTHEAST GULF OF MEXICO HYDROGRAPHIC SURVEY DATA COLLECTED IN 1963,
AD-609 719 DIV. 2
• • •
TAMUREF 69 20T
OBSERVATIONS OF TIDAL PERIODIC INTERNAL WAVES OVER A THREE DAY PERIOD OFF PANAMA CITY, FLORIDA.
AD-609 796 DIV. 2

•TEXAS INSTRUMENTS INC DALLAS
• • •
AUTOMATED BULLETIN AND SEISMIC DATA RETRIEVAL SYSTEM.
AD-609 528 DIV. 2
• • •
TI 03 69 70
LOW-NOISE L-BAND AMPLIFIER.
AD-609 994 DIV. 8
• • •
TI 03 69 88
OPTOELECTRONIC FUNCTIONAL ELECTRONIC BLOCKS.
AD-609 909 DIV. 8

•THERM ADVANCED RESEARCH INC ITHACA N Y
• • •
TAR TR 6909
ON THE THEORY OF THE LOW-ASPECT-RATIO JET-FLAP HYDROFOIL.
AD-609 729 DIV. 9

•THOMPSON RAMO WOOLDRIDGE INC LOS ANGELES CALIF
• • •
GM TR 131
THE EFFECT OF PROPELLANT ENERGY AND MASS DISTRIBUTION ON ROCKET PROPULSION EFFICIENCY.
AD-609 913 DIV. 27

•TRAINING CENTER FOR EXPERIMENTAL AERODYNAMICS RHODE-SAINT-GENESE (BELGIUM)
• • •
OPTIMIZATION OF RECOVERY TRAJECTORIES FOR SPACE VEHICLES.
AD-609 573 DIV. 12

•TRAINING RESEARCH LAB UNIV OF ILLINOIS URBANA
• • •
A MODEL AND CYBERNETIC SYSTEM FOR RESEARCH ON THE TEACHING-LEARNING PROCESS.
AD-609 940 DIV. 29

•TRW SEMICONDUCTORS INC LAWNDALE CALIF
• • •
TRWS TE 4000:19 F
PRODUCTION ENGINEERING MEASURE, TRANSISTOR, VHF, SILICON, POWER (98-70MC).
AD-609 741 DIV. 8

•TRW SPACE TECHNOLOGY LABS LOS ANGELES CALIF
• • •
ERROR ANALYSIS CONSIDERATIONS FOR A SATELLITE RENDEZVOUS
AD-609 484 DIV. 12
• • •
INSTRUCTOR'S NOTES FOR CASE PROBLEMS IN THE CONTRACTUAL ASPECTS OF VALUE ENGINEERING.
(AD 609 662 SUPPL.)
AD-609 883 DIV. 18
• • •
TRAINING AIDS: DESCRIPTION AND FORMAT.
AD-609 884 DIV. 18

•TRW SPACE TECHNOLOGY LABS REDONDO BEACH CALIF
• • •
STL 8987 6002 RU 000
THE TRW TWO-STATION, ON-LINE SCIENTIFIC COMPUTER.
(RADC TDR69 393)
AD-609 720 DIV. 30

•UNITED ELECTRODYNAMICS INC PASADENA CALIF
• • •
EVALUATION TESTS, NATIONAL GEOPHYSICAL COMPANY SEISMOMETER TYPE 21.
AD-609 525 DIV. 2
• • •
STUDY OF AUTOMATIC CALIBRATION OF SEISMOGRAPH SYSTEMS.
AD-609 530 DIV. 2
• • •
EVALUATION OF B AND D SUMMATION TRACES AT THE TONTO FOREST SEISMOLOGICAL OBSERVATORY.
AD-609 531 DIV. 2
• • •
INVESTIGATION OF SYSTEM RESPONSE AS A FUNCTION OF AZIMUTH FROM TONTO FOREST SEISMOLOGICAL OBSERVATORY.
AD-609 532 DIV. 2
• • •
EVALUATION OF THE MULTIPLE ARRAY PROCESSOR IN DETECTING P-WAVE MOTION AT THE T.F.S.O.
AD-609 533 DIV. 2
• • •
EFFECT OF CHANGING MULTIPLE ARRAY PROCESSOR OUTPUT FILTER BAND WIDTH.
AD-609 536 DIV. 2
• • •
EFFECTS OF THUNDERSTORMS ON TFSO OPERATIONS, 1969.
AD-609 537 DIV. 2
• • •
TONTO FOREST SEISMOLOGICAL OBSERVATORY. LINEAR ARRAY PROGRESS.
AD-609 538 DIV. 2

•UNIVAC BLUE BELL PA
• • •
MULTI-LIST SYSTEM: ADDITIONAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
(AFOSR 69 2476)
AD-609 709 DIV. 32
• • •
MULTI-LIST SYSTEM: FINAL NOTES ON A STUDY INTO AUTOMATIC ATTRIBUTE GROUP ASSIGNMENT.
(AFOSR 69 2477)
AD-609 710 DIV. 32

•UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES ENGINEERING CENTER
• • •
MODELING CRITERIA AND TESTING TECHNIQUES FOR THE SIMULATION OF SPACE ENVIRONMENTS.
(FDL TR69 164)
AD-609 858 DIV. 12

•UTAH UNIV SALT LAKE CITY
• • •
IDENTIFYING RESEARCH CHARACTERISTICS IN HIGH SCHOOL STUDENTS, A SECOND STUDY,
(AFOSR 69 2261)
AD-609 489 DIV. 29

• • •
INFORMATION AND SCIENTIFIC CREATIVITY.
(AFOSR 64 2802)
AD-609 486 DIV. 28

• • •
STUDIES TO DETERMINE THE MECHANISM OF PRODUCTION AND REMOVAL OF ELECTRONS IN FLAMES.
AD-609 515 DIV. 10

• • •
DIELECTRIC LOSS IN MGO AND SAPPHIRE.
AD-609 617 DIV. 25

•VIRGINIA UNIV CHARLOTTESVILLE
• • •
CAL 91 P
DYNAMICS OF GAS-PARTICLE MIXTURES WITH FINITE PARTICLE VOLUME.
AD-609 598 DIV. 9

• • •
DEL 14 P
MEASUREMENT AND PREDICTION OF DIFFUSIVITIES TO 1700K IN BINARY SYSTEMS CONTAINING CARBON DIOXIDE.
AD-609 597 DIV. 25

•WASHINGTON UNIV SEATTLE
• • •
PSYCHOLOGICAL MEASUREMENT AND PREDICTION. PART III, THE STRUCTURE OF TESTS.
AD-609 516 DIV. 28

• • •
RADIATIVE ENERGY EXCHANGE OVER ARCTIC LAND AND SEA, PART I, DATA, 1962.
AD-609 583 DIV. 2

• • •
ABSOLUTE EQUIVALENCE OF EXTERIOR DIFFERENTIAL SYSTEMS.
AD-609 687 DIV. 15

•WASHINGTON UNIV ST LOUIS MO
• • •
STRUCTURAL FACTORS AND INDIVIDUAL NEEDS IN GROUP BEHAVIOR.
AD-609 446 DIV. 28

•WATERTOWN ARSENAL LABS MASS
• • •
MS10
BUCKLING CHARACTERISTICS OF THIN CYLINDRICAL SHELLS SUBJECTED TO AXIAL COMPRESSION AND INTERNAL PRESSURE.
AD-609 688 DIV. 25

• • •
MS11
THE EFFECT OF SPECIMEN GEOMETRY ON DETERMINATION OF ELONGATION IN SHEET TENSILE SPECIMENS.
AD-609 689 DIV. 17

• • •
MS12
BALLISTIC CONCEPTS EMPLOYED IN TESTING LIGHTWEIGHT ARMOR.
AD-609 690 DIV. 22

• • •
MS14
THE ELECTRODEPOSITION OF CHROMIUM ALLOYS. A LITERATURE REVIEW.
AD-609 691 DIV. 26

• • •
MS16
QUALITY CONTROL BY NONDESTRUCTIVE TESTING METHODS.
AD-609 694 DIV. 26

• • •
MS17
CERAMICS; THEIR ROLE IN WEAPONRY.
AD-609 696 DIV. 19

• • •
MS2
RESEARCH AND DEVELOPMENT OF MATERIALS FOR GUNS AT WATERTOWN ARSENAL LABORATORIES. IMPACT PROPERTIES OF STEEL MICROSTRUCTURES.
AD-609 672 DIV. 22

• • •
MS3
U. S. ARMY REQUIREMENTS FOR TITANIUM ALLOYS WITH RESPECT TO VEHICULAR APPLICATIONS. ALPHA-BETA TITANIUM ALLOY.
AD-609 673 DIV. 17

• • •
MS4
THE POTENTIAL OF CASTINGS IN FUTURE ARMY VEHICLES.
AD-609 671 DIV. 26

• • •
MS5
TEMPERATURE-STRAIN RATE AND THE BRITTLE FRACTURE PROBLEM.
AD-609 666 DIV. 17

•WATERVLIET ARSENAL N Y
• • •
6420
A STUDY OF THE EFFECT OF SOLIDIFICATION IMPERFECTIONS ON THE TENSILE PROPERTIES OF CAST STEEL.
AD-609 451 DIV. 17

•WESTERN ELECTRIC CO INC LAURELDALE PA
• • •
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES 2N559-2N1094.
AD-609 442 DIV. 8

• • •
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES, 2N560, 2N1051, 2N1072, 2N1195, 1N664, 1N665, 1N666, 1N667, 1N668, 1N669, 1N673, 1N675, 1N697 AND 1N701.
AD-609 522 DIV. 8

•WESTINGHOUSE ELECTRIC CORP FLKRIDGE MD
• • •
PRODUCTION ENGINEERING MEASURE: IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE RELIABILITY OF SILICON PLANAR EPITAXIAL; TRANSISTOR (WX-4001), LOGIC GATE (WM-201), FLIPFLOP (WM-202), AC BINARY (WM-213).
AD-609 445 DIV. 8

•WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
• • •
WRL 64 9F9 108 P2
SOME RECENT ADVANCES IN MICROWAVE PHONON GENERATION AND DETECTION WITH APPLICATIONS TO THE STUDY OF PHONON-LATTICE INTERACTIONS IN DIELECTRIC MATERIALS.
(AFCRL 64 904)
AD-609 479 DIV. 25

•WOLF RESEARCH AND DEVELOPMENT CORP WEST CONCORD MASS
• • •
THE ATTRIBUTE DERIVATION AND DISPLAY SYSTEM FOR THE EXPERIMENTAL DYNAMIC PROCESSOR.
(AFCRL 64 890)
AD-609 488 DIV. 30

•WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS
• • •
WHOI REF 64 21
EROSION OF THE CLIFFS OF OUTER CAPE COD: TABLES AND GRAPHS.
AD-609 839 DIV. 2

• • •
WHOI REF 64 34
DEEP CURRENT MEASUREMENTS NORTH OF PUERTO RICO.
AD-609 853 DIV. 2

•YALE UNIV NEW HAVEN CONN OBSERVATORY
• • •
BASIC EQUATIONS OF THE RELATIVISTIC TEST PARTICLE PROBLEM.
(ARL 64 187)
AD-609 590 DIV. 25

CONTRACT INDEX

•AF AFOSR1 63
POLYTECHNIC INST OF BROOKLYN N Y
PIBAL 848 (AFOSR 64 1873)
AD-609 574 DIV. 9
PIBAL 831 (AFOSR 64 1658)
AD-609 575 DIV. 9
PIBAL 811 (AFOSR 64 1944)
AD-609 576 DIV. 9

•AF AFOSR11 63
UTAH UNIV SALT LAKE CITY (AFOSR 64 2261)
AD-609 485 DIV. 23

•AF AFOSR129 63
CALIFORNIA UNIV LOS ANGELES (AFOSR 64 2483)
F AD-609 598 DIV. 4

•AF AFOSR135 63 AND
SYSTEMS RESEARCH CENTER CASE INST OF TECH CLEVELAND OHIO
SRC 49 A 64 16 (AFOSR 64 2406)
AD-609 570 DIV. 30

•AF AFOSR139 63
ELECTRONICS RESEARCH LAB UNIV OF CALIFORNIA BERKELEY
ERL 64 45
AD-609 487 DIV. 30

•AF AFOSR139 64
ELECTRONICS RESEARCH LAB UNIV OF CALIFORNIA BERKELEY
ERL 64 45
AD-609 487 DIV. 30
ERL 64 26
AD-609 826 DIV. 15

•AF AFOSR144 63
UTAH UNIV SALT LAKE CITY (AFOSR 64 2502)
AD-609 486 DIV. 28

•AF AFOSR24 64
LABORATORY FOR ELECTROSCIENCE RESEARCH NEW YORK UNIV N Y
NYU TR 400 100 (AFOSR 64 2495)
AD-609 504 DIV. 7
NYU TR 400 101 (AFOSR 64 2496)
AD-609 505 DIV. 7

•AF AFOSR347 63
AEROELASTIC AND STRUCTURES RESEARCH LAB MASS INST OF TECH CAMBRIDGE
ASRL TR 119 1 (AFOSR 64 1843)
AD-609 503 DIV. 13

•AF AFOSR499 64
LABORATORY FOR ELECTROSCIENCE RESEARCH NEW YORK UNIV N Y
(AFOSR 64 2176)
F AD-609 490 DIV. 30

•AF AFOSR529 64
STANFORD UNIV CALIF (AFOSR 64 2498)
AD-609 560 DIV. 15

•AF AFOSR588 64
ILLINOIS UNIV URBANA (AFOSR 64 2410)
AD-609 775 DIV. 30

•AF AFOSR62 245
ILLINOIS UNIV URBANA (AFOSR 64 2410)
AD-609 775 DIV. 30

•AF AFOSR63 250
NEW MEXICO UNIV ALBUQUERQUE ENGINEERING EXPERIMENT STATION
ME 10 (AFOSR 64 1715)
AD-609 855 DIV. 25

•AF AFOSR88 63
PENNSYLVANIA HOSPITAL PHILADELPHIA
UNIT FOR EXPERIMENTAL PSYCHIATRY (AFOSR 64 2499)
AD-609 713 DIV. 28

•AF EOAR62 64
LEICESTER UNIV (ENGLAND) (AFOSR 64 2
AD-609 557 DIV. 4

•AF EOAR63 39
TRAINING CENTER FOR EXPERIMENTAL AERODYNAMICS RHODE-SAINT-GENESE (BELGIUM)
F AD-609 573 DIV. 12

•AF04 611 7439
AEROJET-GENERAL CORP SACRAMENTO CALIF
AGC 7439 Q 1
AD-609 628 DIV. 27

•AF04 611 8013
LOCKHEED PROPULSION CO REDLANDS CALIF
LPC 578 P 5
AD-609 747 DIV. 10

•AF04 611 9718
ATLANTIC RESEARCH CORP ALEXANDRIA VA
(RPL TR64 183)
AD-609 607 DIV. 27

•AF04 645 30
RESEARCH AND ADVANCED DEVELOPMENT DIV AVCO CORP WILMINGTON MASS
RAD TR 59 9
AD-609 593 DIV. 12

•AF04 645 56
MARTIN MARIETTA CORP DENVER COLO
MDD M MI 58 8
AD-609 514 DIV. 26

•AF04 647 176
HIGH VELOCITY LAB UNIV OF UTAH SALT LAKE CITY
UU 4 (AFBMD TR59 21)
AD-609 641 DIV. 22

•AF04 647 177
UTAH UNIV SALT LAKE CITY
AD-609 515 DIV. 10

•AF04 647 243
HERCULES POWDER CO MAGNA UTAH
HTO 301
AD-609 640 DIV. 25

•AF04 647 305
RESEARCH AND ADVANCED DEVELOPMENT DIV AVCO CORP WILMINGTON MASS
RAD 9 TM 59 69 (AFBMD TN59 23)
AD-609 738 DIV. 25

•AF04 647 483
STANFORD RESEARCH INST MENLO PARK CALIF
(N63 14955)
F AD-609 616 DIV. 8

•AF04 647 911
BENDIX SYSTEMS DIV BENDIX CORP ANN ARBOR MICH
BENDIX BSC 28251
AD-609 512 DIV. 6
BSC 28252
AD-609 584 DIV. 25

•AF04 647 942
HIGH VELOCITY LAB UNIV OF UTAH SALT LAKE CITY
AD-609 642 DIV. 12

•AF04 694 128
STANFORD RESEARCH INST MENLO PARK CALIF
AD-609 591 DIV. 10

•AF04 694 414
AVCO-EVERETT RESEARCH LAB EVERETT MASS
RR 197 (BSD TDR64 150)
AD-609 577 DIV. 9

•AF04 695 169
AEROSPACE CORP LOS ANGELES CALIF
TDR 169(3250 41)TN 1 (SSD TDR63 48)
AD-609 594 DIV. 8

•AF04 695 469
AEROSPACE CORP LOS ANGELES CALIF
CSR 469(9990)PP 4
AD-609 564 DIV. 30

•AF18 600 1190
THOMPSON RAMO WOOLDRIDGE INC LOS ANGELES CALIF
GM TR 131
AD-609 513 DIV. 27

•AF19 604 5874
LOWELL OBSERVATORY FLAGSTAFF ARIZ (AFCRL 64 926)
F AD-609 547 DIV. 2

•AF19 604 7271
NORTHEASTERN UNIV BOSTON MASS (AFCRL 64 902)
F AD-609 674 DIV. 8

•AF19 604 8377
RENSSELAER POLYTECHNIC INST TROY N Y (AFCRL 64 793)
F AD-609 718 DIV. 7

•AF19 604 8386
HUGHES AIRCRAFT CO CULVER CITY CALIF
P 64 105 (AFCRL 64 950)
F AD-609 703 DIV. 6

•AF19 604 8423
RCA LABS DIV RADIO CORP OF AMERICA PRINCETON N J
(AFCRL 64 899)
F AD-609 705 DIV. 8
(AFCRL 64 893)
AD-609 745 DIV. 8

•AF19 604 8431
MCGILL UNIV MONTREAL (QUEBEC)
AMRG PM 69 (AFCRL 64 896)
AD-609 803 DIV. 2

•AF19 604 8826
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
WRL 64 9F5 108 P2 (AFCRL 64 904)
F AD-609 479 DIV. 25

•AF19 604 8852
BARKLEY AND DEXTER LABS INC FITCHBURG MASS
(AFCRL 64 1003)
AD-609 759 DIV. 25

•AF19 625 2956
BURROUGHS CORP RADNOR PA
F AD-609 820 DIV. 2

•AF19 626 8
INTERNATIONAL ELECTRIC CORP PARAMUS N J
IEC TR 53100 1 (ESD TDR64 514)
AD-609 773 DIV. 5

•AF19 628 1614
WOLF RESEARCH AND DEVELOPMENT CORP WEST CONCORD MASS
(AFCRL 64 890)
F AD-609 488 DIV. 30

•AF19 628 1691
PURDUE UNIV LAFAYETTE IND
SCHOOL OF ELECTRICAL ENGINEERING
PUSEE TR EE64 18 (AFCRL 64 762)
AD-609 724 DIV. 25

•AF19 628 2362
RAYTHEON CO NORWOOD MASS
(AFCRL 64 731)
AD-609 683 DIV. 2
(AFCRL 64 848)
AD-609 684 DIV. 2
(AFCRL 64 730)
AD-609 685 DIV. 2

•AF19 628 2390
MITRE CORP BEDFORD MASS
TM 03903 (ESD TDR64 171)
AD-609 476 DIV. 15
MITRE SR 123 (ESD TDR64 167)
AD-609 477 DIV. 18
TM 04043/0000/00/0/00 (ESD TDR64 149)
AD-609 478 DIV. 8
MITRE SR 125 (ESD TDR64 169)
AD-609 500 DIV. 30

MITRE TM 4073
(ESD TDR64 164)
AD-609 501 DIV. 12
W 07106/0000/00/0/00
(ESD TDR64 156)
AD-609 502 DIV. 12
(ESD TDR64 148 V1)
AD-609 731 DIV. 8
W 06390/0000/01/1/00
(ESD TDR64 635)
AD-609 774 DIV. 8

•AF19 628 2471
ARACON GEOPHYSICS CO CONCORD MASS
ARA 9219 12
(AFCRL 64 807)
F AD-609 493 DIV. 2

•AF19 628 2498
BROWN UNIV PROVIDENCE R I
AD-609 498 DIV. 8

•AF19 628 2771
INSTITUTE OF GEODESY PHOTOGRAMMETRY AND CARTOGRAPHY OHIO STATE UNIV RESEARCH FOUNDATION
IGPC 96
(AFCRL 64 833)
AD-609 455 DIV. 2

•AF19 628 2777
STANFORD RESEARCH INST MENLO PARK CALIF
(AFCRL 64 905)
AD-609 767 DIV. 2

•AF19 628 3263
MONTEK DIV MODEL ENGINEERING AND MFG CORP SALT LAKE CITY UTAH
MONTEK 63 23A
(ESD TDR64 548)
F AD-609 810 DIV. 19

•AF19 628 3317
ENGINEERING PROJECTS LAB MASS INST OF TECH CAMBRIDGE
DSR 9960 1
(ESD TDR64 620)
AD-609 749 DIV. 30

•AF19 628 3819
ILLINOIS UNIV URBANA ENGINEERING EXPERIMENT STATION
(AFCRL 64 952)
AD-609 857 DIV. 8

•AF19 628 3843
GENERAL ELECTRIC CO WASHINGTON D C
(ESD TDR64 656 V1)
F AD-609 763 DIV. 18
(ESD TDR 64 656 V2)
F AD-609 764 DIV. 18
(ESD TDR64 656 V3)
F AD-609 765 DIV. 18

•AF19 628 4014
IONOSPHERE RESEARCH LAB PENNSYLVANIA STATE UNIV UNIVERSITY PARK
IRL 228
(AFCRL 64 948)
AD-609 844 DIV. 2

•AF19 628 489
ATMOSPHERIC RESEARCH LAB OKLAHOMA UNIV RESEARCH INST NORMAN
ARL(UORI) 1397 4
AD-609 723 DIV. 2

•AF19 628 500
LINCOLN LAB MASS INST OF TECH LEXINGTON
(ESD TDR64 587)
AD-609 872 DIV. 5

•AF19 628 500
LINCOLN LAB MASS INST OF TECH LEXINGTON
LL 1964 64
(ESD TDR64 583)
AD-609 929 DIV. 12
(ESD TDR64 561)
AD-609 828 DIV. 29
LL 1965 1
(ESD TDR65 26)
AD-609 851 DIV. 6

•AF29 601 4601
AEROELASTIC AND STRUCTURES RESEARCH LAB MASS INST OF TECH CAMBRIDGE
ASRL 106 2
(BL TR64 107)
AD-609 923 DIV. 25

•AF30 602 0277
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
UB 1363 P 6
(RADC TDR64 461)
F AD-609 619 DIV. 6

•AF30 602 2060
CORNING GLASS WORKS BRADFORD PA
(RADC TDR64 434)
F AD-609 579 DIV. 25

•AF30 602 2819
CONTINENTAL ELECTRONICS MFG CO DALLAS TEX
(RADC TDR64 336)
F AD-609 633 DIV. 6

•AF30 602 2944
SYLVANIA ELECTRIC PRODUCTS INC BUFFALO N Y
(RADC TDR64 428)
F AD-609 809 DIV. 8

•AF30 602 2958
INTERNATIONAL BUSINESS MACHINES CORP BETHESDA MD
(RADC TDR64 149 V5)
F AD-609 466 DIV. 8
(RADC TDR64 149 V2)
F AD-609 467 DIV. 8
(RADC TDR64 149 V6)
F AD-609 468 DIV. 8
(RADC TDR64 149 V3)
F AD-609 470 DIV. 8
(RADC TDR64 149 V1)
F AD-609 471 DIV. 8
(RADC TDR64 149 V4)
F AD-609 472 DIV. 8
(RADC TDR64 149 V7)
F AD-609 473 DIV. 8
(RADC TDR64 149 V8)
F AD-609 474 DIV. 8

•AF30 602 2969
ELECTRO-MECHANICS CO AUSTIN TEX
(RADC TDR64 316)
F AD-609 475 DIV. 8

•AF30 602 2970
MOTOROLA INC PHOENIX ARIZ
(RADC TDR64 142)
F AD-609 808 DIV. 8

•AF30 602 3042
MENTAL HEALTH RESEARCH INST UNIV OF MICHIGAN ANN ARBOR
(RADC TDR64 146)
F AD-609 807 DIV. 28

•AF30 602 3090
RCA LABS DIV RADIO CORP OF AMERICA PRINCETON N J
(RADC TDR64 276)
F AD-609 469 DIV. 30

•AF30 602 3097
TRW SPACE TECHNOLOGY LABS REDONDO BEACH CALIF
STL 8587 6002 RU 000
(RADC TDR64 393)
F AD-609 720 DIV. 30

•AF30 602 3111
GENERAL ELECTRIC CO SYRACUSE N Y
(RADC TDR64 384)
F AD-609 704 DIV. 25

•AF30 602 3135
CUBIC CORP SAN DIEGO CALIF
FER/88 1
(RADC TDR64 318 V1)
F AD-609 750 DIV. 12
(RADC TDR64 318 V2)
F AD-609 751 DIV. 12

•AF30 602 3305
PARAMETRICS INC WALTHAM MASS
(RADC TDR64 388)
AD-609 721 DIV. 4

•AF30 602 3385
SPACE-GENERAL CORP EL MONTE CALIF
SGC 491R 1
(RADC TDR64 360)
F AD-609 719 DIV. 8

•AF30 602 3482
GENERAL ELECTRIC CO SYRACUSE N Y
AD-609 813 DIV. 8

•AF33 600 42486
TEXAS INSTRUMENTS INC DALLAS
AD-609 528 DIV. 2

•AF33 615 1125
TECHNOLOGY INC DAYTON OHIO
(APL TR64 130)
AD-609 748 DIV. 12

•AF33 615 1614
ASTROSYSTEMS INTERNATIONAL INC FAIRFIELD N J
ASTROSYS TR 64001F
(FDL TR64 163)
AD-609 492 DIV. 27

•AF33 615 1952
OPTICS TECHNOLOGY INC BELMONT CALIF
AD-609 842 DIV. 14

•AF33 616 7179
PITTSBURGH UNIV PA
(AMRL TR64 108)
F AD-609 801 DIV. 23
(AMRL TR64 114)
F AD-609 802 DIV. 23

•AF33 616 7806
FIRESTONE FLIGHT SCIENCES LAB CALIF INST OF TECH PASADENA
GALCIT SM 64 12
(ARL 64 174)
AD-609 669 DIV. 25

•AF33 616 8104
REPUBLIC AVIATION CORP FARMINGDALE N Y
(FDL TDR64 113)
AD-609 653 DIV. 26

•AF33 616 8121
MICROWAVE LAB STANFORD UNIV CALIF
(ARL 64 138)
AD-609 567 DIV. 25

•AF33 616 8130
GRUMMAN AIRCRAFT ENGINEERING CORP BETHPAGE N Y
(RTD TDR63 4044 P2)
AD-609 498 DIV. 9
(FDL TDR64 120)
AD-609 559 DIV. 9

•AF33 616 8247
AMERICAN OIL CO WHITING IND
(ML TR64 393)
AD-609 440 DIV. 4

•AF33 616 8493
CINCINNATI UNIV OHIO
(ARL 64 176)
AD-609 568 DIV. 9

•AF33 657 10737
CBS LABS STAMFORD CONN
CLD 1720
(AL TDR64 175 S1)
AD-609 609 DIV. 29

•AF33 657 10925
MICROWAVE ASSOCIATES INC BURLINGTON MASS
(AL TR64 270)
F AD-609 629 DIV. 8

•AF33 657 10944
CINCINNATI UNIV OHIO
(ML TR64 344)
AD-609 690 DIV. 4

•AF33 657 10979
AEROJET-GENERAL NUCLEONICS SAN RAMOS CALIF
AN 1238
(APL TDR64 97)
F AD-609 728 DIV. 27

•AF33 657 11144
STANFORD ELECTRONICS LABS STANFORD UNIV CALIF
SEL 64 096
(AL TR64 264)
AD-609 447 DIV. 8

•AF33 657 11242
PENNSYLVANIA STATE UNIV UNIVERSITY PARK
(ML TR64 346)
F AD-609 899 DIV. 17

•AF33 657 11249
OHIO STATE UNIV COLUMBUS RESEARCH FOUNDATION
(ML TDR64 277)
S AD-609 877 DIV. 30

*AF33 657 11389
PICKARD AND BURNS ELECTRONICS DIV GORHAM CORP WALTHAM MASS
PANDB 916
AD-609 776 DIV. 8

*AF33 657 11398
RCA LABS DIV RADIO CORP OF AMERICA PRINCETON N J
(AL TR64 291)
F AD-609 961 DIV. 8

*AF33 657 11489
RCA DEFENSE ELECTRONIC PRODUCTS PRINCETON N J
AD-609 768 DIV. 24

*AF33 657 11592
TEXAS INSTRUMENTS INC DALLAS
TI 03 64 88
AD-609 909 DIV. 8

*AF33 657 11619
NORTH AMERICAN AVIATION INC LOS ANGELES CALIF
NA 64 927
(AMRL TR64 110)
F AD-609 863 DIV. 16

*AF33 657 7271
YALE UNIV NEW HAVEN CONN OBSERVATORY
(ARL 64 187)
AD-609 590 DIV. 25

*AF33 657 7380
HEAT TRANSFER LAB UNIV OF MINN MINNEAPOLIS
(ARL 64 191)
F AD-609 622 DIV. 25
(ARL 64 149)
AD-609 670 DIV. 25

*AF33 657 7432
MANLABS INC CAMBRIDGE MASS
(ASD TDR62 1087 P3)
AD-609 706 DIV. 17

*AF33 657 7535
ENGINEERING PROJECTS LAB MASS INST OF TECH CAMBRIDGE
DSR 8998 8
(FDL TDR64 127)
AD-609 692 DIV. 12

*AF33 657 7747
UNITED ELECTRODYNAMICS INC PASADENA CALIF
AD-609 929 DIV. 2
AD-609 930 DIV. 2
AD-609 931 DIV. 2
AD-609 932 DIV. 2
AD-609 933 DIV. 2
AD-609 936 DIV. 2
AD-609 937 DIV. 2
AD-609 938 DIV. 2

*AF33 657 820651
GENERAL ELECTRIC CO PHILADELPHIA PA
(ARL 64 192)
AD-609 621 DIV. 25

*AF33 657 8649
MARTIN MARIETTA CORP ORLANDO FLA
OR 2996 1
(ASD TDR63 3061)
F AD-609 906 DIV. 13

*AF33 657 8737
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES ENGINEERING CENTER
(FDL TR64 169)
F AD-609 898 DIV. 12

*AF33 657 9161
MARTIN MARIETTA CORP DENVER COLO
(ML TDR64 280)
AD-609 962 DIV. 25

*AF33 657 9292
RCA SERVICE CO INC CAMDEN N J
AD-609 981 DIV. 16

*AF33 657 9962
PRINCETON UNIV N J
(ARL 64 132)
AD-609 722 DIV. 25

*AF40 600 1000
ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AIR FORCE STATION TENN
TDR64 277
AD-609 841 DIV. 9

*AF49 638 1149
PLASMADYNE CORP SANTA ANA CALIF
FR113 1149
(AFOSR 64 2478)
F AD-609 812 DIV. 25

*AF49 638 1187
AERONAUTICAL RESEARCH ASSOCIATES OF PRINCETON INC N J
ARAP TM 64 2
(AFOSR 64 1924)
AD-609 460 DIV. 9

*AF49 638 1194
UNIVAC BLUE BELL PA
(AFOSR 64 2476)
AD-609 709 DIV. 32
(AFOSR 64 2477)
AD-609 710 DIV. 32

*AF49 638 1231
BUDD CO MCLEAN VA INFORMATION SCIENCES CENTER
(AFOSR 64 2529)
F AD-609 711 DIV. 18

*AF49 638 1283
SPACES SCIENCES LAB GENERAL ELECTRIC CO PHILADELPHIA PA
(AFOSR 64 2471)
F AD-609 496 DIV. 9

*AF49 638 1295
BROWN UNIV PROVIDENCE R I
RT(BU) 40
(AFOSR 64 2028)
AD-609 462 DIV. 25

*AF49 638 1322
QUANTUM ELECTRONICS LAB CALIF INST OF TECH PASADENA
(AFOSR 64 2074)
AD-609 769 DIV. 25

*AF49 638 1325
AEROSPACE RESEARCH CENTER GENERAL PRECISION INC LITTLE FALLS N J
(AFOSR 64 2492)
F AD-609 613 DIV. 2

*AF49 638 523
SOUTHERN RESEARCH INST BIRMINGHAM ALA
SRIB 5737 1054 XIII
(AFOSR 4493)
F AD-609 459 DIV. 17

*AF49 638 565
POULTER RESEARCH LABS STANFORD RESEARCH INST MENLO PARK CALIF
AD-609 885 DIV. 10

STANFORD RESEARCH INST MENLO PARK CALIF
AD-609 886 DIV. 10
AD-609 887 DIV. 10

*AF49 638 659
AVCO-EVERETT RESEARCH LAB EVERETT MASS
AVCO RR 202
AD-609 638 DIV. 8

*AF49 638 700
RAND CORP SANTA MONICA CALIF
RM 4248 PR
AD-609 648 DIV. 32
RM 4329 PR
AD-609 649 DIV. 15
RM 4323 PR
AD-609 791 DIV. 18
RM 4364 PR
AD-609 792 DIV. 2
RM 4324 PR
AD-609 793 DIV. 18
RM 4404 PR
AD-609 882 DIV. 14

*AF49 638 759
SPACE SCIENCES LAB LITTON SYSTEMS INC BEVERLEY HILLS CALIF
SSL(LSI) PUB 3484
(AFOSR 64 1340)
F AD-609 482 DIV. 25

*AF49 638 851
AEROJET-GENERAL CORP AZUSA CALIF
AGC TN 43
(AFOSR 9750)
AD-609 814 DIV. 4

*AF49 638 857
MINNESOTA UNIV MINNEAPOLIS
(AFOSR TN60 1266)
AD-609 866 DIV. 15

*AF49 638 974
FRICK CHEMICAL LAB PRINCETON UNIV N J
(AFOSR 4871)
AD-609 697 DIV. 4

*AF61 052 141
BARCELONA UNIV (SPAIN)
(ARL 64 141)
F AD-609 569 DIV. 4

*AT11 1 69
ARGONNE CANCER RESEARCH HOSPITAL CHICAGO ILL
ACRH 102
AD-609 629 DIV. 16

*AT29 2 1163
REERS (ROLAND F) INC ALEXANDRIA VA
(ARPA VUF1013)
F AD-609 879 DIV. 20

*AT49 5 2110
NAVAL RESEARCH LAB WASHINGTON D C
6179
AD-609 965 DIV. 20

*DA ARO D31 124G AROD
CALIFORNIA UNIV LOS ANGELES
(AROD 2099 22)
F AD-609 941 DIV. 20

*DA ARO D31 124G193
ELECTRONIC SYSTEMS LAB MASS INST OF TECH CAMBRIDGE
ESL R 209
(AROD 3365 2)
AD-609 864 DIV. 19

*DA04 200AMC977A
HEXCEL PRODUCTS INC BERKELEY CALIF
AD-609 867 DIV. 26
AD-609 868 DIV. 26
AD-609 871 DIV. 26

*DA04 495AMC498Z
HELIODYNE CORP LOS ANGELES CALIF
AD-609 736 DIV. 9

*DA04 495ORD1375 GRANT
CALIFORNIA UNIV LOS ANGELES
(AROD 2099 22)
F AD-609 941 DIV. 20

*DA18 064AMC144A
FLORIDA UNIV GAINESVILLE COLL OF ENGINEERING
AD-609 865 DIV. 22

*DA18 108AMC218A
LITTON SYSTEMS INC ST PAUL MINN
LSI 2691
AD-609 804 DIV. 3
LSI 2630 VOL. 1
S AD-609 809 DIV. 3

S AD-609 806 DIV. 3

*DA18 108AMC228A
SPACELABS INC VAN NUYS CALIF
SPACELABS SR 64 1014 (7200)
F AD-609 982 DIV. 3

*DA28 043AMC00073E
COORDINATED SCIENCE LAB UNIV OF ILLINOIS URBANA
CSL R 186
AD-609 699 DIV. 23
CSL R 237
AD-609 700 DIV. 8

*DA28 043AMC00109E
TEXAS INSTRUMENTS INC DALLAS
TI 03 64 70
AD-609 494 DIV. 8

*DA30 069AMC170A
FAIRCHILD SPACE AND DEFENSE SYSTEMS SYOSSET N Y
AD-609 737 DIV. 22

•DA30 0690RD2918
MALAKER LABS INC HIGH BRIDGE N J
AD-609 600 DIV. 10

•DA36 039AMC01461E
INTERNATIONAL RESISTANCE CO PHILADELPHIA PA
AD-609 602 DIV. 8

•DA36 039AMC01473E
ASSEMBLY PRODUCTS INC CHESTERLAND OHIO
AD-609 510 DIV. 7

•DA36 039AMC01477E
SPERRY MICROWAVE ELECTRONICS CO CLEARWATER FLA
SJ222 0045 5
AD-609 661 DIV. 8

•DA36 039AMC01481E
BERYLLIUM CORP READING PA
AD-609 686 DIV. 8

•DA36 039AMC01483E
CRYSTALONICS INC CAMBRIDGE MASS
AD-609 596 DIV. 8

•DA36 039AMC02208E GRANT
COORDINATED SCIENCE LAB UNIV OF ILLINOIS URBANA
CSL R 235
AD-609 698 DIV. 28

•DA36 039AMC03617E
WESTINGHOUSE ELECTRIC CORP ELKRIDGE MD
AD-609 995 DIV. 8

•DA36 039AMC03623E
MALLORY (P R) AND CO INC INDIA NAPOLIS IND
AD-609 707 DIV. 8

•DA36 039AMC03635E
PIEZO CRYSTAL CO CARLISLE PA
AD-609 963 DIV. 8

•DA36 039AMC03636E
SYSTEMS INC ORLANDO FLA
AD-609 716 DIV. 8

•DA36 039SC72729
WESTERN ELECTRIC CO INC LAURELDALE PA
AD-609 992 DIV. 8

•DA36 039SC81294
WESTERN ELECTRIC CO INC LAURELDALE PA
AD-609 922 DIV. 8

•DA36 039SC89955
CORNELL-DUBILIER ELECTRIC CORP NEW BEDFORD MASS
AD-609 639 DIV. 8

•DA36 039SC89960
TRW SEMICONDUCTORS INC LAWNDALE CALIF
TRWS TE 4000:15 F
F AD-609 741 DIV. 8

•DA36 039SC89965
GENERAL ELECTRIC CO SYRACUSE N Y
F AD-609 563 DIV. 8

•DA36 039SC89987
MICROWAVE ASSOCIATES INC BURLINGTON MASS
AD-609 761 DIV. 8

•DA36 039SC86731
GENERAL ELECTRIC CO SYRACUSE N Y
AD-609 843 DIV. 8

•DA36 039SC89111
MARINE LAB UNIV OF MIAMI CORAL GABLES FLA
AD-609 921 DIV. 8

•DA42 007AMC21R
METRONICS ASSOCIATES INC PALO ALTO CALIF
METRONICS TR 111
AD-609 840 DIV. 3

•DA44 009AMC124T
BAUSCH AND LOMB INC ROCHESTER N Y
AD-609 779 DIV. 14

•DA44 177TC757
INSTRUMENTATION LAB MASS INST OF TECH CAMBRIDGE
R 428
(TRECOM TR64 50)
AD-609 593 DIV. 1

•DA44 146XZ018
STANFORD RESEARCH INST MENLO PARK CALIF
(DASA 1266 4)
F AD-609 555 DIV. 2

•DA44 168AMC118D
RADIO CORP OF AMERICA SOMERVILLE N J
AD-609 626 DIV. 8

•FA WA4206
AIRBORNE INSTRUMENTS LAB INC DEER PARK N Y
(FAA RD64 126)
F AD-609 497 DIV. 19

•FA-WA4607
GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF
GDC 64 222
(FAA ADS19)
F AD-609 615 DIV. 1

•GRANT NSF GP2914
IONOSPHERE RESEARCH LAB PENNSYLVANIA STATE UNIV UNIVERSITY PARK
IRL 228
(AFCRL 64 948)
AD-609 844 DIV. 2

•GRANT NSF G21722
CALIFORNIA UNIV LOS ANGELES
AD-609 456 DIV. 28

•GRANT NSG237 62
CALIFORNIA UNIV LOS ANGELES
AD-609 457 DIV. 28

•GRANT PHS-MH00792 09
WASHINGTON UNIV SEATTLE
AD-609 516 DIV. 28

•NASW1101
AVCO-EVERETT RESEARCH LAB EVERETT MASS
AVCO RR 202
AD-609 638 DIV. 8

•NIH GM09608 03
RAND CORP SANTA MONICA CALIF
P 3036
AD-609 681 DIV. 30

•NONRS87264
ITT INDUSTRIAL LABS FORT WAYNE IND
ITT 3308
AD-609 744 DIV. 8

•NONRSR81564
LITTLE (ARTHUR D) INC CAMBRIDGE MASS
ALI 1501064
AD-609 589 DIV. 6

•NONRSR87535
RADIO CORP OF AMERICA HARRISON N J
AD-609 572 DIV. 8

•NONRSR89356
MICROWAVE ASSOCIATES INC BURLINGTON MASS
AD-609 678 DIV. 8

•NONRSR89439
INTERNATIONAL RESISTANCE CO PHILADELPHIA PA
F AD-609 623 DIV. 8

•NONRSR89452
HUGHES AIRCRAFT CO OCEANSIDE CALIF
AD-609 491 DIV. 8

•NONR586347
NARMCO RESEARCH AND DEVELOPMENT DIV WHITTAKER CORP SAN DIEGO CALIF
(AD 605 552 SUPPL.)
AD-609 695 DIV. 21

•NONR590301
DOUGLAS AIRCRAFT CO INC SANTA MONICA CALIF
SM 47785
AD-609 610 DIV. 14

•NONR G00011 64
COLUMBIA UNIV NEW YORK
F AD-609 614 DIV. 15

•NONR G00033 63
QUEENS COLL FLUSHING N Y
AD-609 676 DIV. 28

•NONR 26321
DAVIDSON LAB STEVENS INST OF TECH HOBOKEN N J
SIT DL 1046
AD-609 856 DIV. 9

•NONR0002264
INSTITUTE FOR TUBERCULOSIS RESEARCH UNIV OF ILLINOIS RCHICAGO
AD-609 860 DIV. 16

•NONR110013
PURDUE UNIV LAFAYETTE IND
AD-609 852 DIV. 10

•NONR125400
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS
WHOI REF 64 21
AD-609 839 DIV. 2

•NONR128806
UTAH UNIV SALT LAKE CITY
AD-609 617 DIV. 25

•NONR167701
BRANDEIS UNIV WALTHAM MASS
AD-609 578 DIV. 4

•NONR168202
CALVIN COLL GRAND RAPIDS MICH
AD-609 876 DIV. 7

•NONR184198
MASSACHUSETTS INST OF TECH CAMBRIDGE
AD-609 603 DIV. 20

•NONR186616
CRUFT LAB HARVARD UNIV CAMBRIDGE MASS
CRUFT TR 457
AD-609 772 DIV. 15
CRUFT TR 454
AD-609 777 DIV. 15

•NONR211904
TEXAS A AND M UNIV COLLEGE STATION
TAMU REF 64 19T
AD-609 715 DIV. 2
TAMUREF 64 20T
AD-609 796 DIV. 2

•NONR21194
TEXAS A AND M UNIV COLLEGE STATION
TAMU REF 64 26T
AD-609 714 DIV. 2

•NONR219600
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS
WHOI REF 64 21
AD-609 839 DIV. 2

•NONR221609
MARINE PHYSICAL LAB UNIV OF CALIFORNIA SAN DIEGO
MPL U 50/64
AD-609 490 DIV. 2

•NONR221612
SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA
SIO REF 64 11
A AD-609 859 DIV. 2

•NONR221623
SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA
SIO REF 64 11
A AD-609 859 DIV. 2

•NONR22280
CALIFORNIA UNIV BERKELEY
AD-609 981 DIV. 30

•NONR22567
HIGH ENERGY PHYSICS LAB STANFORD UNIV CALIF
HEPL 393
AD-609 587 DIV. 20

•NONR23398
CALIFORNIA UNIV LOS ANGELES
AD-609 456 DIV. 28
AD-609 457 DIV. 28

•NONR23358
CALIFORNIA UNIV LOS ANGELES
AD-609 453 DIV. 16

•NONR26655
COLUMBIA UNIV NEW YORK SCHOOL OF ENGINEERING AND APPLIED SCIENCE
AD-609 677 DIV. 26

•NONR273300
J G ENGINEERING RESEARCH ASSOCIATES BALTIMORE MD
AD-609 634 DIV. 25
AD-609 635 DIV. 25
AD-609 636 DIV. 25

•NONR275000
FYE RESEARCH FOUNDATION BETHESDA MD
F AD-609 511 DIV. 16

•NONR286600
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS
WHOI REF 64 34
AD-609 853 DIV. 2

•NONR338700
DECO ELECTRONICS INC BOULDER COLO
DECO 30 P 7
AD-609 717 DIV. 8

•NONR343600
INSTITUTE OF BEHAVIORAL RESEARCH TEXAS CHRISTIAN UNIV FORT WORTH
AD-609 735 DIV. 28

•NONR347700
AEROCHEM RESEARCH LABS INC PRINCETON N J
AEROCHEM TN 49
AD-609 817 DIV. 10
AEROCHEM TP 49
AD-609 818 DIV. 10

•NONR362300
VIRGINIA UNIV CHARLOTTESVILLE
DEL 14 P
AD-609 597 DIV. 25
CAL 91 P
AD-609 598 DIV. 9

•NONR37516
HYDRAULIC ENGINEERING LAB UNIV OF TEXAS AUSTIN
HYD 04 6402
AD-609 778 DIV. 9

•NONR392700
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
RM 1744 S 2
F AD-609 799 DIV. 8

•NONR39612
RHODE ISLAND UNIV KINGSTON
AD-609 627 DIV. 5

•NONR396305
MASSACHUSETTS INST OF TECH CAMBRIDGE
AD-609 611 DIV. 17

•NONR396401
MCCRONE RESEARCH INST CHICAGO ILL
F AD-609 726 DIV. 25

•NONR397700
MONSANTO RESEARCH CORP DAYTON OHIO
AD-609 800 DIV. 4

•NONR398504
TRAINING RESEARCH LAB UNIV OF ILLINOIS URBANA
AD-609 540 DIV. 23

•NONR40939
NEW YORK STATE COLL OF AGRICULTURE CORNELL UNIV ITHACA
BU 166 M
AD-609 464 DIV. 32
BU 170 M
AD-609 465 DIV. 32

•NONR412600
TECHNICAL OPERATIONS RESEARCH BURLINGTON MASS
TO B 64 15
AD-609 643 DIV. 25

•NONR418800
SPACE SCIENCES LAB GENERAL ELECTRIC CO PHILADELPHIA PA
R64SD78
AD-609 837 DIV. 25
R64SD77
AD-609 838 DIV. 25

•NONR427100
PROTEUS INC WHIPPANY N J
F AD-609 821 DIV. 14

•NONR427500
THERM ADVANCED RESEARCH INC ITHACA N Y
TAR TR 6405
F AD-609 729 DIV. 9

•NONR431400
DUNLAP AND ASSOCIATES INC SANTA MONICA CALIF
AD-609 725 DIV. 23

•NONR440100
ARCON CORP LEXINGTON MASS
AD-609 601 DIV. 15

•NONR446800
HUGHES AIRCRAFT CO CULVER CITY CALIF
HAC 2732.01/23
AD-609 762 DIV. 1

•NONR451100
MONSANTO RESEARCH CORP EVERETT MASS
MRB300902
AD-609 609 DIV. 4

•NONR47715
WASHINGTON UNIV SEATTLE
AD-609 687 DIV. 15

•NONR47724
WASHINGTON UNIV SEATTLE
AD-609 583 DIV. 2

•NONR47733
WASHINGTON UNIV SEATTLE
AD-609 516 DIV. 28

•NONR55126
PENNSYLVANIA UNIV PHILADELPHIA
AD-609 592 DIV. 25

•NONR56230
BROWN UNIV PROVIDENCE R I
DIV OF APPLIED MATHEMATICS
AD-609 657 DIV. 14

•NONR59119
RENSSELAER POLYTECHNIC INST TROY N Y
AD-609 608 DIV. 14

•NONR66819
ROCHESTER UNIV N Y
AD-609 606 DIV. 14

•NONR76024
CARNEGIE INST OF TECH PITTSBURGH PA GRADUATE SCHOOL OF INDUSTRIAL ADMINISTRATION
ONR RM 135
AD-609 508 DIV. 28

•NONR81611
WASHINGTON UNIV ST LOUIS MO
A AD-609 446 DIV. 28

•NONR83912
POLYTECHNIC INST OF BROOKLYN N Y
AD-609 816 DIV. 25

•NORD9195
DEFENSE RESEARCH LAB UNIV OF TEXAS AUSTIN
DRL 222
AD-609 742 DIV. 12

•NOW61 0716C
SKF INDUSTRIES INC PHILADELPHIA PA
AL64T067
F AD-609 437 DIV. 14

•NOW62 0419C
CLIMAX MOLYBDENUM CO OF MICHIGAN DETROIT
F AD-609 815 DIV. 17

•NOW64 0061D
MIDWEST RESEARCH INST KANSAS CITY MO
F AD-609 730 DIV. 25

•NOW64 0239C
IIT RESEARCH INST CHICAGO ILL
IITRI 86021 5
AD-609 727 DIV. 17

•NOW64 0275D
METALLURGICAL RESEARCH LABS SYRACUSE UNIV N Y
MET.E1160 1064 QP3
AD-609 739 DIV. 17

•NSF GP692
SYSTEMS RESEARCH CENTER CASE INST OF TECH CLEVELAND OHIO
SRC 49 A 64 16
(AFOSR 64 2406)
AD-609 570 DIV. 30

•NSF G23554
COORDINATED SCIENCE LAB UNIV OF ILLINOIS URBANA
CSL R 235
AD-609 698 DIV. 28

•N140 70024 756868
PARKE MATHEMATICAL LABS INC CARLISLE MASS
AD-609 529 DIV. 25

•N189 181 57827A X
BROWN UNIV PROVIDENCE R I
AD-609 760 DIV. 25

•N61339 1449
AMERICAN INST FOR RESEARCH PALO ALTO CALIF
AD-609 605 DIV. 23

•N62558 3061
STRATHCLYDE UNIV GLASGOW (SCOTLAND) CHEMISTRY DEPT
F AD-609 712 DIV. 4

•OCD 0562 122
BUREAU OF SOCIAL SCIENCE RESEARCH INC WASHINGTON D C
BSSR 354 5
F AD-609 752 DIV. 32

•OCD 0562 214
ARGONNE CANCER RESEARCH HOSPITAL CHICAGO ILL
ACRH 102
AD-609 624 DIV. 16

•OCD 0563 97
AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA INST FOR PERFORMANCE TECHNOLOGY
AD-609 480 DIV. 18

•OE2 10 057
PITTSBURGH UNIV PA
(AMRL TR64 114)
F AD-609 802 DIV. 23

•PHS GM09608 03
RAND CORP SANTA MONICA CALIF
RM 4375 NIH
AD-609 835 DIV. 15

•SD-90
MASSACHUSETTS INST OF TECH CAMBRIDGE
AD-609 611 DIV. 17

•SDA6
BROWN UNIV PROVIDENCE R I
DIV OF APPLIED MATHEMATICS
AD-609 657 DIV. 14

BROWN UNIV PROVIDENCE R I
AD-609 495 DIV. 8

AD-DIVISION INDEX

AD-609 436	DIV. 6
AD-609 437	DIV. 14
AD-609 438	DIV. 30
AD-609 439	DIV. 25
AD-609 440	DIV. 4
AD-609 441	DIV. 12
AD-609 442	DIV. 8
AD-609 443	DIV. 16
AD-609 444	DIV. 16
AD-609 445	DIV. 8
AD-609 446	DIV. 28
AD-609 447	DIV. 8
AD-609 448	DIV. 4
AD-609 449	DIV. 22
AD-609 450	DIV. 30
AD-609 451	DIV. 17
AD-609 452	DIV. 2
AD-609 453	DIV. 16
AD-609 454	DIV. 2
AD-609 455	DIV. 2
AD-609 456	DIV. 28
AD-609 457	DIV. 28
AD-609 458	DIV. 9
AD-609 459	DIV. 17
AD-609 460	DIV. 9
AD-609 461	DIV. 8
AD-609 462	DIV. 25
AD-609 463	DIV. 8
AD-609 464	DIV. 32
AD-609 465	DIV. 32
AD-609 466	DIV. 8
AD-609 467	DIV. 8
AD-609 468	DIV. 8
AD-609 469	DIV. 30
AD-609 470	DIV. 8
AD-609 471	DIV. 8
AD-609 472	DIV. 8
AD-609 473	DIV. 8
AD-609 474	DIV. 8
AD-609 475	DIV. 8
AD-609 476	DIV. 15
AD-609 477	DIV. 18
AD-609 478	DIV. 8
AD-609 479	DIV. 25
AD-609 480	DIV. 18
AD-609 481	DIV. 16
AD-609 482	DIV. 25
AD-609 483	DIV. 18
AD-609 484	DIV. 12
AD-609 485	DIV. 23
AD-609 486	DIV. 28
AD-609 487	DIV. 30
AD-609 488	DIV. 30
AD-609 489	DIV. 1
AD-609 490	DIV. 2
AD-609 491	DIV. 8
AD-609 492	DIV. 27
AD-609 493	DIV. 2
AD-609 494	DIV. 8
AD-609 495	DIV. 8
AD-609 496	DIV. 9
AD-609 497	DIV. 19
AD-609 498	DIV. 15
AD-609 499	DIV. 9
AD-609 500	DIV. 30
AD-609 501	DIV. 12
AD-609 502	DIV. 12
AD-609 503	DIV. 13
AD-609 504	DIV. 7
AD-609 505	DIV. 7
AD-609 506	DIV. 13
AD-609 507	DIV. 15
AD-609 508	DIV. 28
AD-609 509	DIV. 8
AD-609 510	DIV. 7
AD-609 511	DIV. 16
AD-609 512	DIV. 6
AD-609 513	DIV. 27
AD-609 514	DIV. 26
AD-609 515	DIV. 10
AD-609 516	DIV. 28
AD-609 517	DIV. 26
AD-609 518	DIV. 26
AD-609 519	DIV. 12
AD-609 520	DIV. 18
AD-609 521	DIV. 8
AD-609 522	DIV. 8
AD-609 523	DIV. 25
AD-609 524	DIV. 12
AD-609 525	DIV. 2
AD-609 526	DIV. 14
AD-609 527	DIV. 10
AD-609 528	DIV. 2
AD-609 529	DIV. 25
AD-609 530	DIV. 2
AD-609 531	DIV. 2
AD-609 532	DIV. 2
AD-609 533	DIV. 2
AD-609 534	DIV. 9
AD-609 535	DIV. 30
AD-609 536	DIV. 2
AD-609 537	DIV. 2
AD-609 538	DIV. 2
AD-609 539	DIV. 13
AD-609 540	DIV. 23
AD-609 541	DIV. 20
AD-609 542	DIV. 28
AD-609 543	DIV. 28
AD-609 544	DIV. 28
AD-609 545	DIV. 28
AD-609 546	DIV. 28
AD-609 547	DIV. 2
AD-609 548	DIV. 32
AD-609 549	DIV. 32
AD-609 550	DIV. 32
AD-609 551	DIV. 32
AD-609 552	DIV. 25
AD-609 553	DIV. 1
AD-609 554	DIV. 17
AD-609 555	DIV. 2
AD-609 556	DIV. 32
AD-609 557	DIV. 4
AD-609 558	DIV. 4
AD-609 559	DIV. 9
AD-609 560	DIV. 15
AD-609 562	DIV. 25
AD-609 563	DIV. 8
AD-609 564	DIV. 30
AD-609 565	DIV. 20
AD-609 566	DIV. 6
AD-609 567	DIV. 25
AD-609 568	DIV. 9
AD-609 569	DIV. 4
AD-609 570	DIV. 30
AD-609 571	DIV. 15
AD-609 572	DIV. 8
AD-609 573	DIV. 12
AD-609 574	DIV. 9
AD-609 575	DIV. 9
AD-609 576	DIV. 9
AD-609 577	DIV. 9
AD-609 578	DIV. 9
AD-609 579	DIV. 25
AD-609 580	DIV. 30
AD-609 581	DIV. 30
AD-609 582	DIV. 3
AD-609 583	DIV. 2
AD-609 584	DIV. 25
AD-609 585	DIV. 18
AD-609 586	DIV. 15
AD-609 587	DIV. 20
AD-609 588	DIV. 15
AD-609 589	DIV. 6
AD-609 590	DIV. 25
AD-609 591	DIV. 10
AD-609 592	DIV. 10
AD-609 593	DIV. 12
AD-609 594	DIV. 8
AD-609 595	DIV. 9
AD-609 596	DIV. 8
AD-609 597	DIV. 25
AD-609 598	DIV. 9
AD-609 599	DIV. 9
AD-609 600	DIV. 10
AD-609 601	DIV. 15
AD-609 602	DIV. 8
AD-609 603	DIV. 20
AD-609 604	DIV. 29
AD-609 605	DIV. 23
AD-609 606	DIV. 14
AD-609 607	DIV. 27
AD-609 608	DIV. 14
AD-609 609	DIV. 4
AD-609 610	DIV. 14
AD-609 611	DIV. 17
AD-609 613	DIV. 2
AD-609 614	DIV. 15
AD-609 615	DIV. 1
AD-609 616	DIV. 8
AD-609 617	DIV. 25
AD-609 618	DIV. 17
AD-609 619	DIV. 6
AD-609 620	DIV. 30
AD-609 621	DIV. 25
AD-609 622	DIV. 25
AD-609 623	DIV. 8
AD-609 624	DIV. 16
AD-609 625	DIV. 8
AD-609 626	DIV. 8
AD-609 627	DIV. 5
AD-609 628	DIV. 27
AD-609 629	DIV. 9
AD-609 630	DIV. 31
AD-609 631	DIV. 31
AD-609 632	DIV. 9
AD-609 633	DIV. 6
AD-609 634	DIV. 25
AD-609 635	DIV. 25
AD-609 636	DIV. 25
AD-609 637	DIV. 30
AD-609 638	DIV. 8
AD-609 639	DIV. 8
AD-609 640	DIV. 25
AD-609 641	DIV. 22
AD-609 642	DIV. 12
AD-609 643	DIV. 25
AD-609 644	DIV. 18
AD-609 645	DIV. 20
AD-609 646	DIV. 30
AD-609 647	DIV. 26
AD-609 648	DIV. 32
AD-609 649	DIV. 15
AD-609 650	DIV. 4
AD-609 651	DIV. 17
AD-609 652	DIV. 12
AD-609 653	DIV. 26
AD-609 654	DIV. 15
AD-609 655	DIV. 8
AD-609 656	DIV. 15
AD-609 657	DIV. 14
AD-609 658	DIV. 8
AD-609 659	DIV. 32
AD-609 660	DIV. 32
AD-609 661	DIV. 8
AD-609 662	DIV. 29
AD-609 663	DIV. 14
AD-609 664	DIV. 4
AD-609 665	DIV. 14
AD-609 666	DIV. 17
AD-609 667	DIV. 12
AD-609 668	DIV. 23
AD-609 669	DIV. 25
AD-609 670	DIV. 25
AD-609 671	DIV. 26
AD-609 672	DIV. 22
AD-609 673	DIV. 17
AD-609 674	DIV. 8
AD-609 675	DIV. 8
AD-609 676	DIV. 28
AD-609 677	DIV. 26
AD-609 678	DIV. 20
AD-609 679	DIV. 8
AD-609 680	DIV. 32
AD-609 681	DIV. 30
AD-609 683	DIV. 2
AD-609 684	DIV. 2
AD-609 685	DIV. 2
AD-609 686	DIV. 8
AD-609 687	DIV. 15
AD-609 688	DIV. 25
AD-609 689	DIV. 17
AD-609 690	DIV. 22
AD-609 691	DIV. 26
AD-609 692	DIV. 15
AD-609 693	DIV. 2
AD-609 694	DIV. 26
AD-609 695	DIV. 31
AD-609 696	DIV. 14
AD-609 697	DIV. 4
AD-609 698	DIV. 28
AD-609 699	DIV. 22
AD-609 700	DIV. 8
AD-609 701	DIV. 25
AD-609 702	DIV. 25
AD-609 703	DIV. 6
AD-609 704	DIV. 25
AD-609 705	DIV. 8
AD-609 706	DIV. 17
AD-609 707	DIV. 8
AD-609 708	DIV. 14
AD-609 709	DIV. 32
AD-609 710	DIV. 32
AD-609 711	DIV. 18
AD-609 712	DIV. 4
AD-609 713	DIV. 28
AD-609 714	DIV. 2
AD-609 715	DIV. 2
AD-609 716	DIV. 8
AD-609 717	DIV. 8
AD-609 718	DIV. 7
AD-609 719	DIV. 8
AD-609 720	DIV. 30
AD-609 721	DIV. 4
AD-609 722	DIV. 25
AD-609 723	DIV. 2
AD-609 724	DIV. 25
AD-609 725	DIV. 23
AD-609 726	DIV. 25
AD-609 727	DIV. 17
AD-609 728	DIV. 27
AD-609 729	DIV. 9
AD-609 730	DIV. 25
AD-609 731	DIV. 8
AD-609 732	DIV. 16
AD-609 733	DIV. 30
AD-609 734	DIV. 18
AD-609 735	DIV. 28
AD-609 736	DIV. 9
AD-609 737	DIV. 22
AD-609 738	DIV. 25
AD-609 739	DIV. 17
AD-609 740	DIV. 2
AD-609 741	DIV. 8
AD-609 742	DIV. 12
AD-609 743	DIV. 27
AD-609 744	DIV. 8
AD-609 745	DIV. 8
AD-609 746	DIV. 27
AD-609 747	DIV. 10
AD-609 748	DIV. 12
AD-609 749	DIV. 30
AD-609 750	DIV. 12
AD-609 751	DIV. 12
AD-609 752	DIV. 32
AD-609 753	DIV. 11
AD-609 754	DIV. 11
AD-609 755	DIV. 33
AD-609 756	DIV. 33

AD-609 757	DIV. 11	AD-609 801	DIV. 23	AD-609 845	DIV. 30
AD-609 758	DIV. 33	AD-609 802	DIV. 23	AD-609 846	DIV. 29
AD-609 759	DIV. 25	AD-609 803	DIV. 2	AD-609 847	DIV. 29
AD-609 760	DIV. 25	AD-609 804	DIV. 3	AD-609 848	DIV. 29
AD-609 761	DIV. 8	AD-609 805	DIV. 3	AD-609 849	DIV. 29
AD-609 762	DIV. 1	AD-609 806	DIV. 3	AD-609 850	DIV. 29
AD-609 763	DIV. 18	AD-609 807	DIV. 28	AD-609 851	DIV. 6
AD-609 764	DIV. 18	AD-609 808	DIV. 8	AD-609 852	DIV. 10
AD-609 765	DIV. 18	AD-609 809	DIV. 8	AD-609 853	DIV. 2
AD-609 766	DIV. 17	AD-609 810	DIV. 19	AD-609 854	DIV. 2
AD-609 767	DIV. 2	AD-609 811	DIV. 28	AD-609 855	DIV. 29
AD-609 768	DIV. 24	AD-609 812	DIV. 25	AD-609 856	DIV. 9
AD-609 769	DIV. 25	AD-609 813	DIV. 8	AD-609 857	DIV. 8
AD-609 770	DIV. 19	AD-609 814	DIV. 4	AD-609 858	DIV. 12
AD-609 771	DIV. 33	AD-609 815	DIV. 17	AD-609 859	DIV. 17
AD-609 772	DIV. 15	AD-609 816	DIV. 25	AD-609 860	DIV. 16
AD-609 773	DIV. 5	AD-609 817	DIV. 10	AD-609 861	DIV. 2
AD-609 774	DIV. 8	AD-609 818	DIV. 10	AD-609 862	DIV. 2
AD-609 775	DIV. 30	AD-609 819	DIV. 27	AD-609 863	DIV. 16
AD-609 776	DIV. 8	AD-609 820	DIV. 2	AD-609 864	DIV. 15
AD-609 777	DIV. 15	AD-609 821	DIV. 14	AD-609 865	DIV. 22
AD-609 778	DIV. 9	AD-609 822	DIV. 30	AD-609 866	DIV. 15
AD-609 779	DIV. 14	AD-609 823	DIV. 30	AD-609 867	DIV. 26
AD-609 780	DIV. 25	AD-609 824	DIV. 30	AD-609 868	DIV. 26
AD-609 781	DIV. 1	AD-609 825	DIV. 32	AD-609 869	DIV. 9
AD-609 782	DIV. 4	AD-609 826	DIV. 15	AD-609 870	DIV. 17
AD-609 783	DIV. 17	AD-609 827	DIV. 16	AD-609 871	DIV. 26
AD-609 784	DIV. 30	AD-609 828	DIV. 25	AD-609 872	DIV. 5
AD-609 785	DIV. 25	AD-609 829	DIV. 17	AD-609 873	DIV. 32
AD-609 786	DIV. 25	AD-609 830	DIV. 30	AD-609 874	DIV. 20
AD-609 787	DIV. 4	AD-609 831	DIV. 25	AD-609 875	DIV. 4
AD-609 788	DIV. 9	AD-609 832	DIV. 6	AD-609 876	DIV. 7
AD-609 789	DIV. 2	AD-609 833	DIV. 27	AD-609 877	DIV. 30
AD-609 790	DIV. 16	AD-609 834	DIV. 25	AD-609 878	DIV. 22
AD-609 791	DIV. 18	AD-609 835	DIV. 15	AD-609 879	DIV. 2
AD-609 792	DIV. 2	AD-609 836	DIV. 27	AD-609 880	DIV. 12
AD-609 793	DIV. 18	AD-609 837	DIV. 25	AD-609 881	DIV. 31
AD-609 794	DIV. 8	AD-609 838	DIV. 25	AD-609 882	DIV. 14
AD-609 795	DIV. 8	AD-609 839	DIV. 2	AD-609 883	DIV. 18
AD-609 796	DIV. 2	AD-609 840	DIV. 3	AD-609 884	DIV. 18
AD-609 797	DIV. 30	AD-609 841	DIV. 9	AD-609 885	DIV. 10
AD-609 798	DIV. 17	AD-609 842	DIV. 14	AD-609 886	DIV. 10
AD-609 799	DIV. 8	AD-609 843	DIV. 8	AD-609 887	DIV. 10
AD-609 800	DIV. 4	AD-609 844	DIV. 2	AD-609 888	DIV. 31

OTHER RESEARCH REPORTS AND RELATED MATERIAL

*Descriptors marked with an asterisk are included in the subject index

1. Aircraft and Flight Equipment

AD-443 699 Div. 1, 9, 23, 30
OTS Prices: HC $7.00/None

Air Force Aerospace Research Pilot School, Edwards AFB, Calif.
STABILITY AND CONTROL.
Nov 64, 340p FTC-TIH-64-2004
Unclassified report

Revised ed.

Descriptors: (*Aeronautics, Flight testing), (*Flight testing, Aerospace craft), (*Air force training, Flight testing), (*Aerospace craft, Flight testing), Aircraft, Stability, Control, Aerodynamic characteristics, Aerodynamic control surfaces, Pilots, Training, Handbooks, Theory.

This Handbook has been compiled by the instructors of the Stability and Control Branch of the Aerospace Research Pilot School. Part I consists of flight test techniques and data reduction methods that have been developed at the Air Force Flight Test Center, Edwards Air Force Base, California. It is intended to be complete in that the flight test techniques, data reduction and data presentation are included in each chapter. Part II consists of the theory associated with flight tests. This portion is not intended to be original work, although some of it is, but to be a compilation from several reference books. It is used in the Aerospace Research Pilot School as a study aid to the student so that he will not have to spend excessive time researching the material that is covered.

Patent 3,154,779 Div. 1

ALTITUDE CORRECTION TECHNIQUES.
Navy-assigned Patent,
by Charles R. Kenny. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flight instruments), (*Flight instruments, Height finding), (*Height finding, Flight instruments), Altimeters, Radar equipment, Display systems, Wiring diagrams.

The aircraft radar system for producing cathode ray tube representations of ground range includes an altitude correction circuit. Circuitry is provided for production of sweep type voltages effective to provide a representation of true ground distances.

Patent 3,157,890 Div. 1, 3

EJECTION DEVICE FOR AIRCRAFT CRASH DYE MARKER.
Navy-assigned Patent,
by John Mellon, Jr., Jonathan Harding, and William J. Zarkowski, Jr. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Markers), (*Markers, Aircraft), (*Ditching, Markers), Explosive actuators, Buoys, Sea water, Ejectors (Ordnance), Jettisonable equipment.

The buoyant marker is mounted on an aircraft. When activated the marker indicates the point at which an aircraft sank into water. An explosive is used to release a gas which drives the marker buoy from the aircraft.

Patent 3,158,018 Div. 1

3-D FLIGHT TABLE.
Navy-assigned Patent,
by Charles M. Edwards, Murray Kanes, Paul F. Fischer, Franklin O. Geiger, and Melvin S. Feder. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flight simulators), (*Flight simulators, Test equipment), Aircraft equipment, Flight testing, Simulation, Gimbles, Hydraulic servomechanisms, Design.

The flight table is useful in simulating and testing aeronautical equipment. The flight table has a supporting base, one gimbal mounted on the base, a second gimbal mounted on the first gimbal and electrohydraulic servos geared to the gimbals.

Patent 3,158,344 Div. 1

EJECTION SEAT FACE CURTAIN RESTRAINT SYSTEM.
Navy-assigned Patent,
by Chris T. Koochembere. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Ejection seats), (*Ejection seats, Aviation safety).

The face curtain protects the head of a pilot during ejection from an aircraft. A downward restraint is attached to the forward end of the face curtain to limit its upward movement during ejection. The restraint is in the form of a Dacron webbing.

2. Astronomy, Geophysics and Geography

AD-449 739 Div. 2, 30
OTS Prices: HC $3.00

Lincoln Lab., Mass. Inst. of Tech., Lexington.
HAYSTACK POINTING SYSTEM: STARS.

Group rept.,
by H. E. Frachtman. 25 Sep 64, 64p LL-1964-47
Contract AF19 628 500
ESD TDR64 380

Unclassified report

Descriptors: (*Celestial mechanics, Programming (Computers)), (*Programming languages, Celestial mechanics), (*Stars, Tracking), Astronomy, Bessel functions, Data processing systems, Magnetic tape, Time, Diurnal variations, Corrections.

This report describes the procedure used by the Haystack pointing computer program for obtaining the celestial coordinates of the stars at any time.

Patent 3,154,381 Div. 2, 8, 14, 26

PROGRESSIVE MELTING AND CRYSTALLIZATION OF SYNTHETIC MICA.
Interior-assigned Patent,
by Haskiel R. Shell and Norman A. Pace.
27 Oct 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Mica), (*Mica, Crystallization), Melting, Furnaces, Crystals, Fluorine, Electron tubes, Capacitors.

The mica is used in vacuum tubes and capacitors. An electric furnace is used. The melt is kept in a molten state sufficiently long for optimum crystallization to take place. The method is especially for preparing crystals of synthetic fluorine mica.

PB-166 572 Div. 2, 18, 24, 30
OTS Prices: HC $3.00/MF $0.75

Technical Operations, Inc., Burlington, Mass.
FORMULATION OF A SEMIAUTOMATIC TOPOGRAPHIC DATA PROCESSING SYSTEM FOR THE ARMY IN THE 1965-1975 DECADE.
Final rept., phase 2, 15 Feb-11 Jul 59,
by J. D. Bassett, F. C. Brooks, C. Friedman, and C. S. Miller. 11 Jul 59, 86p TO-B59-10
Contract DA44 009eng3503, Proj. 8 35 03 121B
AD 220 320

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Mapping, Automation), (*Data processing systems, Mapping), (*Terrain, Mapping), Maps, Military requirements, Data transmission systems, Facsimile equipment, Computers, Display systems, Geodesics.

The final phase of a two phase study program, resulting in the formulation of a semiautomatic topographic data processing (SATDPS) for use by the future Army in the field is represented. Results of the Phase I study are summarized, and the objectives of the final system are set forth. Desired system capabilities, the capabilities of available components and subsystems, and the manner in which they may be used to attain the desired system performance are discussed. Details of component characteristics, including mapping, storage, computer, communications, and display devices, along with estimates of performance rates and amounts of equipment required are included. The role of computing equipment in the SATDPS is discussed. Flow diagrams are shown. A specific system for 1965, a test system for 1961, and suggestions for future development are given. (Author)

3. Chemical Warfare Equipment and Materials

Patent 3,158,351 Div. 3, 13

CHARGING VALVE.
Navy-assigned Patent,
by Samuel H. Kauffman and Richard W. Holden. 24 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Valves), (*Valves, Underwater equipment), Springs, Seals (Stoppers), Pressure vessels.

The miniature charging valve is for pressurizing underwater equipment. The valve stem reciprocates in its housing during opening and closing. Two springs are associated with the valve stem. The springs are coiled about the stem and normally bias a conical surface on the valve head and an O-ring into sealing arrangement with the valve seat.

4. Chemistry

AD-449 857 Div. 4, 9
OTS Prices: HC $2.00/None

Lincoln Lab., Mass. Inst. of Tech., Lexington.
NUMERICAL METHODS IN THE CHEMICAL KINETICS OF HIGH TEMPERATURE AIR.
Technical rept.,
by L. B. Raisty. 29 Jul 64, 42p LL-TR-361
Contract AF19 628 500
ESD TDR64 356

Unclassified report

Descriptors: (*Atmosphere entry, Reaction kinetics), (*Reaction kinetics, Programming (Computers)), Air, Dissociation, Gas ionization, Gas flow, Chemical bonds, Vibration, Relaxation time, Atomic energy levels, Differential equations, Integration, Reentry vehicles.

A computer program is described which performs a one-dimensional gas kinetic calculation, with rate chemistry and vibrational relaxation, when the pressure is a known function of distance. The numerical integration is described in detail. A numerical procedure is presented with which the integration can be continued indefinitely, eventually reaching equilibrium, even when some of the variables reach quasi-equilibrium early in the computation. To demonstrate the capabilities of this procedure, graphical results are given for pressure functions which approximate the pressure acting on an air particle in the flow field of a re-entry object, from a point immediately behind the bow shock to a point far out in the wake. (Author)

Patent 3,154,375 Div. 4

POTASSIUM PLUTONIUM SULFATE SEPARATION PROCESS.
AEC-assigned Patent,
by Michael Cefola Yonkers. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Plutonium), (*Plutonium, Separation), Chemical precipitation, Sulfates, Plutonium compounds, Potassium compounds, Neutron capture, Contamination, Chemical analysis.

Plutonium is separated from solutions having a pH below 7.1 by precipitation with ions of potassium and sulfate ions. The plutonium values are reacted with the ions in an aqueous medium containing from 10 to 50 percent by weight of methyl alcohol. The precipitate is then separated from the solution.

Patent 3,158,468 Div. 4, 17

SEPARATION OF AN ACTINIDE METAL FROM AN ALLOY.
AEC-assigned Patent,
by Harry Pearlman and Lloyd A. Hanson. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Material separation), (*Thorium, Material separation), (*Thorium alloys, Magnesium alloys), Liquids, Lithium, Chemical precipitation, Processing.

Thorium is recovered from a thorium-magnesium alloy by dissolving the alloy in liquid lithium under an inert gas atmosphere and then separating the thorium precipitate from the resulting molten lithium-magnesium alloy.

Patent 3,158,578 Div. 4

PROCESS FOR PRODUCING SULFUROUS ACID TREATED ALUMINA.
Agriculture-assigned Patent,
by Walter A. Pons, Jr., James C. Kuck, and Vernon L. Frampton. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Bleaching agents), (*Bleaching agents, Vegetable oils), (*Vegetable oils, Bleaching agents), Aluminum compounds, Oxides, Materials, Processing, Sulfur, Inorganic acids, Solutions, Manufacturing methods, Production.

The activated alumina is effective for bleaching refined cottonseed oil. It is prepared by soaking ground activated alumina with an aqueous solution of sulfurous acid until a specific saturation is reached. The alumina is then removed from the solution and dried.

Patent 3,158,633 Div. 4, 14

PROCESS FOR PREPARATION OF VINYL ESTERS.
Agriculture-assigned Patent,
by William S. Port and Harry A. Monroe, Jr. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Esters), (*Esters, Synthesis (Chemistry)), Carboxylic acids, Catalysts, Sulfonates, Formates, Stearates, Preparation.

A saturated aliphatic carboxylic acid and at least an equimolar amount of vinyl acetate are heated in the presence of a mercuric salt such as mercuric acetate and of about from 0.5 to 2.0 percent, based on weight of the carboxylic acid, of an alkanesulfonic acid to produce the vinyl ester of the carboxylic acid with no formation of carboxylic anhydride and the vinyl ester product separated from the reaction mixture.

PB-166 564 Div. 4, 13
OTS Prices: HC $4.00/MF $1.00

Mason - Rust, Louisville, Ky.
SALINE WATER DEMONSTRATION PLANT NO. 3, WEBSTER, SOUTH DAKOTA.
Annual rept. no. 2, 1 Jul 63-30 Jun 64, Sep 64, 110p
Contract 14 01 001 225
OSW PR132
Unclassified report

Saline Water conversion progress rept.

Descriptors: (*Sea water, Desalination), (*Desalination, Sea water), (*Distilling plants, Performance (Engineering)), History, Operation, Maintenance, Maintenance equipment, Costs, Membranes, Electrodialysis.

The report on the maintenance and operation of Brackish Water Conversion Demonstration Plant No. 3, located in Webster, South Dakota, presents the plant maintenance and operational history and the technical, economic and administrative evaluations of the plant's operation during the period 1 July 1963 through 30 June 1964. The electrodialysis or electric membrane method was selected as the process for Demonstration Plant No. 3.

PB-166 567 Div. 4, 13
OTS Prices: HC $4.00/MF $1.00

California Univ., Los Angeles.
SCALE CONTROL IN SEA WATER EVAPORATORS, POINT LOMA I, SAN DIEGO, CALIFORNIA.
Saline Water research and development progress rept., by Stewart F. Mulford. Nov 64, 124p
OSW PR133
Unclassified report

Master's thesis.

Descriptors: (*Sea water, Scale), (*Desalination, Sea water), (*Evaporators, Scale), Control, Heat transfer, Surfaces, Inhibition, Material removal, Tests, Distilling plants, Sodium compounds, Phosphates, Sulfuric acid, Performance (Engineering), Operation.

The nature and importance of deposits of foreign matter, known as 'scale', on heat transfer surfaces of distillation equipment used to make fresh water from sea water are described. Methods of preventing, controlling, and/or removing scale deposits are discussed in terms

of theory and of commercial practice. A multistage flash distillation plant is described. Tests with two different treatments of the sea water feed to this distillation plant, consisting respectively of the addition of 'Hagevap' (a proprietary mixture the principal constituent of which is sodium polyphosphate) and of concentrated sulfuric acid, are described and the results analyzed. The 'Hagevap' treatment retarded the deterioration of overall plant thermal performance to less than 5% per month of operation. The acid treatment effectively prevented deterioration of plant thermal economy in the normal operating ranges of temperature and brine concentration. With the acid treatment, scaling limits at extended ranges of temperature and brine concentration were explored. (Author)

5. Communications

AD-449 485 Div. 5, 12
OTS Prices: HC $1.00/None

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE LINCOLN EXPERIMENTAL SATELLITE (LES).
Group rept.,
by D. C. MacLellan, H. Sherman, and P. Waldron.
14 Oct 64, 20p LL-1964-55
Contract AF19 628 500 Unclassified report
ESD TDR64 559
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Space communication systems, Satellites (Artificial)), (*Communication satellites (Active), Space communication systems), Launching, Launch vehicles (Aerospace), Orbital trajectories, Telemeter systems, Tracking, Radiofrequency, X band, Monitors, Horn antennas, Heat shields, Payload, Booster motors.

A brief description is given of the goals, launch program, early configurations, components, and features of the Lincoln Experimental Communications Satellite (LES).

Patent 3,158,810 Div. 5, 1, 12

FSK KEYING SYSTEM EMBODYING PHASE COHERENCE.
Navy-assigned Patent,
by Robert R. Stone. 24 Nov 64 Unclassified patent
Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Frequency shift keyers), (*Frequency shift keyers, Pulse communication systems), Phase (Electronics), Very low frequency, Supersonic planes, Guided missiles, Spacecraft.

The frequency shift keying arrangement is for use in pulse communication systems operating in the VLF range. The frequency shift keying arrangement embodies a phase correction means of the 'boat strap' variety wherein the extent of deviation controls the extent of correction. The system is used in communication systems associated with supersonic aircraft, missiles and space vehicles.

6. Detection

AD-448 493 Div. 6, 8
OTS Prices: HC $2.00/None

Electronics Research Lab., Univ. of California, Berkeley.

ON THE POSSIBILITIES OF DETECTION OF PERIODIC DISTURBANCES ON A ROUGH SURFACE USING RADIO TECHNIQUES,
by R. H. Clarke. 29 May 64, 41p ERL-64-21
Contract Nonr365611, Grant AF AFOSR139 63
AFOSR 64 1906
Unclassified report

Descriptors: (*Electromagnetic wave reflections, Radio waves), (*Radio waves, Electromagnetic wave reflections), (*Detection, Electromagnetic wave reflections), (*Surface properties, Detection), Underwater, Targets, Water waves, Periodic variations, Radio scanning, Electron optics, Theory, Experimental data, Feasibility studies.

The theory of reflection of electromagnetic waves from a moving sinusoidal disturbance, on both rough and still water, is presented in a simple approximate form. It is shown that the detection of such a disturbance is, in principle, a practical possibility. Some of the requirements of such a detection system are briefly discussed. The basis of the simplified theory is discussed in detail, and new experimental results are presented to demonstrate the validity of the approach used. (Author)

Patent 3,154,745 Div. 6

DIRECT CURRENT COUPLED CROSSOVER DETECTOR CIRCUIT.
Navy-assigned Patent,
by Robert H. Begeman. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Detectors), (*Radar receivers, Detectors), (*Detectors, Radar receivers), Direct current, Target resolution, Radar targets.

A direct current coupled crossover detector of a radar receiver circuit is disclosed. The sum and difference target object signals of a twin-lobe monopulse radar intercepted target object from an amplitude phase sensing antenna are utilized in the IF circuits of the radar receiver to produce an output voltage operative in the radar indicator circuit to improve resolution in the target area.

Patent 3,154,781 Div. 6

RADAR ELEVATION DISPLAY.
Navy-assigned Patent,
by Glover D. Johnson. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radar tracking), (*Radar tracking, Display systems), (*Display systems, Radar tracking), Target position indicators, Target angle, Cathode ray tube screens, Tracking.

The system is useful in tracking a target. A 'dark-tube' display system is provided in which the signals are integrated electrically before display on the cathode-ray tube and in which a signal produces a long pulse which illuminates many adjacent spots on the phosphor and is not disturbed by lack of synchronization of range and elevation sweeps.

Patent 3,158,672 Div. 6

ANTENNA BEAM WIDTH SIMULATOR.

Navy-assigned Patent,
by George M. Trinite, Jr. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Antenna simulators), (*Radar antennas, Antenna simulators), (*Detection, Simulation), Demodulators, Radar targets, Signal generators, Power supplies, Potentiometers, Azimuth, Amplifiers, Differentiating circuits, Oscillators, Resistors, Diodes, Capacitors, Beams (Electromagnetic), Thickness.

The device simulates an electromagnetic detection unit. It simulates the orientation of a radar antenna and the width of the antenna beam. The system includes a range sawtooth generator, a target signal generator, a power source, a motor, two elevation potentiometers, an azimuth potentiometer, gearing associated with the potentiometers, a control handle for the radar operator, and other conventional components including amplifiers, a differential circuit, a blocking oscillator, resistors, diodes and capacitors.

Patent 3,158,676 Div. 6, 30

GYROSCOPE MOUNTED CASSEGRAIN TELESCOPE WITH CENTRAL SUPPORT FOR SECONDARY MIRROR.
Navy-assigned Patent,
by Francis McCaffrey. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Telescopes), (*Telescopes, Supports), Mirrors, Gyroscopes, Mounting brackets.

The support for the secondary mirror of a Cassegrain type telescope does not obstruct the radiant energy from sources within the field of view of the telescope. The telescope forms an integral portion of the rotor of a gyroscope.

Patent 3,158,762 Div. 6, 7

BILAMINAR TRANSDUCERS.
Navy-assigned Patent,
by John J. Horan. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents: Electroacoustic transducers), (*Electroacoustic transducers, Sonar equipment), Piezoelectric transducers, Ferroelectric materials, Barium alloys, Titanium alloys, Sandwich construction, Electric connectors.

The double-bilaminar piezo-electric acoustic transducer is for use in underwater sonar. The air gap or pressure-release medium utilizes a minumum of space. The electrical connections to the electroded areas of the transducers are made in such a location as to allow stacking of multiple-unit transducer arrays.

Patent 3,158,830 Div. 6

SIGNAL CORRELATION METHOD AND MEANS.
Navy-assigned Patent,
by Clarence S. Clay, Jr. 24 Nov 64 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Underwater sound equipment), (*Underwater sound signals, Correlation techniques), Depth finding, Propagation, Signal generators.

The signal correlation device is for use in a noisy medium, for example, in the field of oceanic depth measurement in oil prospecting techniques. Signal correlation techniques are utilized to match a propagated signal with a non-repetitive generated signal and to produce a representative signal from the propagated signals, the representative signal having the same time relation to the original, generated signal as the propagated signal has.

Patent 3,158,831 Div. 6

UNDERWATER ACOUSTIC INTENSITY METER.
Navy-assigned Patent,
by George L. Boyer. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Acoustic equipment), (*Acoustics, Underwater equipment), Intensity, Meters, Accelerometers, Piezoelectric transducers, Particles, Integrated circuits, Velocity.

An underwater acoustic intensity meter system is disclosed. A stiffness controlled accelerometer is used having a large mass mounted on a piezoelectric transducer that is excited in a thickness mode to provide a wide frequency range of operation and a high sensitivity to measure the particle acceleration. An electronic integrating circuit is used to derive the particle velocity from the acceleration.

Patent 3,158,859 Div. 6, 12

DOPPLER RADAR SYSTEM.
Navy-assigned Patent,
by Arnold E. Resnik. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Doppler radar), (*Radar, Doppler systems), Guided missiles, Aircraft, Radar targets, Guidance.

The radar system is utilized to guide a fused guided missile to an aircraft target. The secondary doppler effects are utilized between a moving object and a secondary reflecting surface to detect the presence of the object and indicate its point of closest approach to a reference point such as a ground position or a missile.

Patent 3,158,860 Div. 6, 1

TARGET ACQUISITION TIME REDUCTION CIRCUIT FOR TRACKING RADAR.
Navy-assigned Patent,
by Francis T. Thompson. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radar tracking), (*Radar tracking, Target acquisition), (*Target acquisition, Radar tracking), Airborne, Fluorescent screens, Cathode ray tubes, Azimuth, Aircraft, Pilots, Time, Circuits.

The system enables the pilot of an aircraft to accomplish target lock-on. The system includes a conductive transparent overlay which is placed over the fluorescent screen of the cathode ray tube indicator of a target tracking radar system, which overlay has a potential applied across the face in each of the azimuthal and vertical directions. An electrically conductive pencil is operative to be manually positionable at any point on the conductive overlay to pick up the two potentials at the position selected producing azimuthal and vertical potential signals applicable to the azimuth and range tracking circuits of a range tracking radar system.

7. Electrical Equipment

AD-400 919 Div. 7
OTS Prices: HC $3.00

General Electric Co., West Lynn, Mass.
ION EXCHANGE MEMBRANE FUEL CELL.
Semiannual technical rept. no. 1, 1 Oct-31 Dec 62, by Henri J. R. Maget. 31 Dec 62, 58p
Contract DA36 039AMC00095E, ARPA Order 80, Task OST76 11 001 36

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ion exchange, Fuel cells), (*Fuel cells, Ion exchange), (*Membranes, Ion exchange), Surfaces, Surface properties, Transport properties, Heat transfer, Hydrogen, Oxygen, Osmosis, Water, Air, Electrodes, Electrolytes, Solids, Electrolytic cells, Life expectancy, Design, Reaction kinetics, Power supplies.

Water transport through membranes and membrane/electrode interfacial properties of cation exchange membranes, for fuel cell applications, have been investigated. Limiting current densities for the electrochemical oxygen reduction have been measured at different oxygen partial pressures. A noval air current collector design has allowed steady state operation at 50 amps/sq ft on hydrogen and air.

AD-491 407 Div. 7
OTS Prices: HC $1.00

Allis-Chambers Mfg. Co., Milwaukee, Wis.
DEVELOPMENT OF ELECTROMAGNETIC PUMPS SUITABLE FOR PUMPING LIQUID METALS. 100 KW UNIPOLAR GENERATOR.
Interim progress rept. no. 10, by Edward L. Young. 1 Jul 52, 20p
Contract NObs47750

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Generators, Electromagnetic pumps), (*Electromagnetic pumps, Generators), (*Liquid metal pumps, Power supplies), Direct current, Design, Performance (Engineering), Liquid metals, Stainless steel, Copper, Welding, Nickel, Seals (Stoppers), Liquid level gages, Voltage.

A unipolar generator capable of supplying 100 kw of d-c power at 1 volt and 100,000 amperes has been developed as a power source for a direct current linear electromagnetic pump. The generator efficiency for one test point at this output was 75%. Minor changes in the present design would be desirable to improve the operating characteristics of this machine. The test program is continuing, and should be extended to include endurance tests. (Author)

CAPE-875 Div. 7

Oak Ridge National Lab. Tenn.
REGULATED HIGH VOLTAGE POWER SUPPLY/ Q-2077/.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Power supplies, Voltage regulators), (*Voltage regulators, Transistors), Mechanical drawings.

Seven drawings are presented for three corona-regulated, transistorized power supplies providing d-c outputs of 900 v at 20 micro amp, 1200 v at 2 micro amp, and 1400 v at 2 micro amp from d-c inputs of 12 v at 11, 8.5, and 7.5 mamp, respectively. Individual titles are given in the Engineering Materials List (TID-4100). (AEC Abstract)

Patent 3,154,040 Div. 7, 22

SEA WATER BATTERY AUTOMATIC FLOW REGULATION VALVE.
Navy-assigned Patent,
by Warren E. Neubert. 27 Oct 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Water-activated batteries), (*Water-activated batteries, Valves), (*Valves, Water-activated batteries), Sea water, Electrolytes, Springs, Control, Power supplies, Torpedo components, Fluid flow.

The valve structure is utilized to control the flow of sea water electrolyte in a battery which is the power source for a torpedo. The valve is spring controlled. The flow of electrolyte through the battery is variable in accordance with the speed of the missile through the water.

Patent 3,156,433 Div. 7, 12, 25

MAGNETOHYDRODYNAMIC GENERATOR.
Navy-assigned Patent,
by Edward A. White, Jr. 10 Nov 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Generators), (*Magneto-hydrodynamics, Generators), (*Generators, Spacecraft), (*Spacecraft, Generators), Plasma engines, Power supplies, Plasma medium, Reentry vehicles, Atmosphere entry, Plasma jets, Gas ionization, Auxiliary power plants.

The magnetohydrodynamic generator is for use as a sole or auxiliary power source in a space vehicle. The naturally ionized layers of gas through which the vehicle passes may be utilized to generate electrical power.

Patent 3,156,588 Div. 7, 22

ECCENTRIC SEPARATOR FOR GALVANIC BATTERY.
Navy-assigned Patent,
by William G. Darland, Jr. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Battery separators), (*Battery separators, Patents), (*Projectiles, Batteries and components), Electrocytes, Spin-stabilized ammunition, Power supplies.

The battery is designed for use in a spinning projectile. The eccentric design of the cell channel results in complete cell filling by the electrolyte on off-center spins of the projectile up to the eccentricity of the inner diameter. The battery is of the force fill type.

Patent 3,157,802 Div. 7, 20

THERMIONIC ENERGY CONVERTER.
AEC-assigned Patent,
by Raymond Fox. 17 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Thermionic converters), Thermionic converters, Energy conversion), Nuclear reactors, Cathodes, Anodes, Radiators, Barium, Cesium, Mixtures, Vapors.

The heat conversion system includes a nuclear reactor, a cathode electrode spatially disposed about the reactor, an anode spatially disposed about the cathode and a radiator to dissipate heat. A mixture of barium and cesium vapors is disposed in the space between the anode and cathode.

Patent 3,158,420 Div. 7

UNDERWATER ELECTRICAL CONNECTOR.
Navy-assigned Patent,
by Le Roy O. Olson and Stanley R. Murphy.
24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric connectors), (*Electric connectors, Underwater), Seals (Stoppers).

The connector is suited for underwater operation and usage. The connector has a socket in which a fibrous conductive substance is located. This substance is isolated from the atmosphere by a resilient packing that is maintained in radial compression to enhance its self-sealing qualities. The plug portion includes a slender needle-like member for penetrating the packing and making conductive contact with the fibrous substance.

Patent 3,158,791 Div. 7

ENERGY RECOVERY COIL DRIVER.
Navy-assigned Patent,
by Raymond J. Deneen, Jr., Frank H. Heissenbuttel, III, and Kenneth E. Wood. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Relays), (*Relays, Circuits), (*Circuits, Relays), Coils, Storage, Capacitors, Transistors, Inductance, Energy, Recovery.

An energy recovery circuit is provided for inductive driver circuits to reduce the average and peak power requirements in the energization of the inductive circuits. The circuit, utilizing a storage capacitor, can be adapted to supply more than one initial inductive circuit.

Patent 3,158,795 Div. 7, 1

MAGNETIC SWITCH OVERLOAD DEVICE.
Air Force-assigned Patent,
by William F. Carr. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flight control systems), (*Flight control systems, Safety devices), (*Safety devices, Circuits), Aircraft, Control systems, Coils, Magnetic cores.

The circuit can be used in an aircraft control system for control surfaces. The magnetic switch structure includes a discontinuous magnetizable core having a drive coil wound thereon, two pole pieces defining an air gap, and a rotor of magnetizable material pivotally mounted between the pole pieces for affecting the magnetic field in the gap according to its position.

8. Electronics and Electronic Equipment

AD-425 990 Div. 8
OTS Prices: HC $3.00/None

New Mexico Univ., Albuquerque.
THE CALIBRATION AND INTERPRETATION OF RECORDED SHOCK-TUBE PRESSURE DATA USING PIEZOELECTRIC SENSORS,
by F. J. Janza and C. W. Hicks. Nov 63, 82p
Contract AF29 601 6002, Proj. 1080, Task 108005
RTD TDR63 3073; N64 13308
Unclassified report

Descriptors: (*Shock waves, Piezoelectric gages), (*Piezoelectric gages, Calibration), Shock tubes, Pressure, Errors, Noise (Radio), Signal-to-noise ratio, Resonance, Bandwidth, Monitors, Soils, Test equipment, Temperature, Electrostatics, Propagation.

This report is intended to serve as a guide, or basis, for the calibration and analysis of recded pressure data. Many of the techniques and areas covered are also applicable to other types of gages; i,e., strain, velocity, acceleration, etc. Photographs of typical shock-tube data are generously used to familiarize the reader with the actual appearance of the true pressure pulse which has been modulated by the effects of resonance, overshoot, groundloops, inadequate bandwidth, and poor gage isolation. (Author)

AD-445 821 Div. 8
OTS Prices: HC $6.00/None

Electronics Research Lab., Univ. of California, Berkeley.

SYNTHESIS OF DUAL REFLECTOR ANTENNAS,
by Victor Galindo. 30 Jul 64, 281p ERL-64-22
Grants AF AFOSR139 63, AF AFOSR139 64
AFOSR 64 1583

Unclassified report

Descriptors: (*Antennas, Reflectors), (*Antenna configurations, Mathematical models), Design, Mathematical models, Differential equations, Diffraction, Numerical analysis, Analytic geometry.

A synthesis method based on geometrical optics for designing a dual reflector antenna system with an arbitrary phase and amplitude distribution in the aperture of the second reflector is presented. The first reflector may be illuminated by a pattern with an arbitrarily curved phase front. A pair of first order ordinary nonlinear differential equations of the form $dy/dx = f(x, y)$ are developed for the system. Questions concerning uniqueness, existence, and bounds for the solutions are discussed. Calculations and numerical results for the design of a uniform amplitude and phase dual-reflector system are presented. The diffraction effects of the small reflector are analyzed by the methods of geometrical diffraction. Their effects upon the aperture distribution of the larger reflector are analyzed in detail. Correction for the small reflector diffracted field is obtained partially by an iterative procedure utilizing the above synthesis method. It is shown, although not conclusively, by extensive numerical analysis that complete correction for the diffraction effects is not possible. (Author)

AD-448 350 Div. 8, 12
OTS Prices: HC $1.00/None

Lincoln Lab., Mass. Inst. of Tech., Lexington.
INTRODUCTION TO THE TRADEX RADAR SYSTEM,
by G. R. Curry. 15 Jul 64, 20p LL-TR-357
Contract AF19 628 500, ARPA Order 166
ESD TDR64 350

Unclassified report

Rept. on Proj. DEFENDER.

Descriptors: (*Radar tracking, Guided missiles (Surface-to-surface)), (*Radar equipment, Performance (Engineering)), Reentry vehicles, Space flight, Ultrahigh frequency, Very high frequency, L band, Optical instruments, Recording systems.

A description is given of the TRADEX radar system with emphasis on system concepts, capabilities, and limitations. The basic operation of each portion of the system is discussed, and the data outputs are described. The radar parameters are given in the Appendix. The operation of the over-all PRESS system is briefly described. (Author)

Patent 3,154,687 Div. 8

OPTICAL FEEDBACK IMAGE INTENSIFYING SYSTEM.
Navy-assigned Patent,
by Martin L. Perl and Lawrence W. Jones. 27 Oct 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Image intensifiers (Electronics), Optical equipment, Image tubes, Optical images, Feedback amplifiers, Feedback, Gates (Circuits), Nuclear physics, Electron optics.

The image intensifer finds use in nuclear physics as one of the components of a luminescent chamber for photographically recording the visible light patterns produced by the motion of charged atomic and subatomic particles through various media. A flip-flop feedback image intensifier is provided wherein a pair of image tubes are alternately gated to obviate the need of fine registry in the system.

Patent 3,154,713 Div. 8

HIGH INTENSITY SHORT ARC LAMP.
Navy-assigned Patent,
by Norman C. Beese. 27 Oct 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Discharge tubes), (*Discharge tubes, Resonance absorption), Electric discharges, Electric arcs, Gas discharges, Cathodes (Electron tubes), Communication systems, Optics.

The arc lamp is operative in optical communication systems. The lamp is made of fused quartz and is shaped to provide a central enlarged envelope section and outer tubular sections which house the anode and cathode structures of the loop. The enlarged central zone of the envelope is designed to eliminate acoustical resonant frequency when the lamp is operated or modulated.

Patent 3,154,750 Div. 8

HIGH FREQUENCY PHASE SPLITTER UTILIZING BIFILAR WINDINGS.
Navy-assigned Patent,
by Charles E. David and Robert L. Haynes. 27 Oct 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Inverter circuits), (*Inverter circuits, Transistors), (*Circuits, Transistors), High frequency, Voltage, Filament wound construction.

The transistorized inverter circuit provides first and second outputs that are balanced and opposite in phase. The circuit is particularly useful where the input voltage source is one of very high frequency.

Patent 3,156,768 Div. 8, 5

VARIABLE LENGTH CODE METHOD AND SYSTEM.
Army-assigned Patent,
by Leo H. Wagner. 10 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Coding), (*Coding, Pulse communication systems), (*Pulse communication systems, Coding), Communication systems, Communication theory.

The pulse code communication system has an arrangement for transmitting characters of widely varying occurrence frequency with increasing communication efficiency. The code is made up in frames analogous to the character groups of Teletype code but with too few elements in each frame to identify anywhere near all of the many characters of a complete alphabet.

Patent 3,156,846 Div. 8

HIGH POWER THYRATRON INVERTER WITH A LOW VALUE RESISTOR BY-PASS.

Navy-assigned Patent,
by Hugo J. Wilms, Jr. and John B. Drew.
10 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Inverters), (*Inverters, Thyratrons), Resistors, Anodes (Electron tubes), Cathodes (Electron tubes), Gases.

The gaseous thyratron is for use in a thyratron inverter. It has an anode, a control grid, a cathode, and a resistance connected directly between the control grid and cathode within the envelope.

Patent 3,156,873 Div. 8

DIFFERENTIAL AMPLIFIER.
Navy-assigned Patent,
by Thomas R. Williams. 10 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Amplifiers), (*Amplifiers, Patents), Push-pull amplifiers, Resistors, Cathodes (Electron tubes), Voltage, Resistance (Electrical).

In an embodiment, a pair of push-pull amplifier stages are balanced with respect to ground. A pair of resistors are inserted between the cathode of the electron tube in each stage and ground. The A.C. potential variation across the load resistance of each tube, or a portion thereof, is fed back to the junction between the cathode resistors of the other tube. The input signals whose difference is to be obtained are fed into the control grids of the two tubes, one signal to each tube. The output signals are derived from the junctions between the cathode resistors of each tube.

Patent 3,156,904 Div. 8, 30

PASSIVE TRANSISTOR-MAGNETIC CORE SWITCHING SYSTEM.
Navy-assigned Patent,
by Hugo M. Beck. 10 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Switching circuits), (*Switching circuits, Computer storage devices), Computer logic, Data storage systems, Magnetic core storage, Magnetic cores, Transistors, Coupling circuits, Hysteresis.

The register shift circuit is for transferring information with a minimum of energy consumption. The system is based on the use of magnetic elements having rectangular hysteresis loops which are stable in two states and a passive transistor coupling network.

Patent 3,157,451 Div. 8

RETRACTABLE ELECTRICAL CONNECTOR.
Navy-assigned Patent,
by Wilbert G. Martini. 17 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric connectors), (*Electric connectors, Electron tubes), Electrical conductance, Electric terminals, Printed circuits, Electric cables.

The electrical connector is associated with vacuum tube connectors. A sleeve connector is secured to a molded member having electrical conductors embedded therein and electrically coupled to the sleeve connector. The molded member is slidably mounted in a housing to permit the sleeve connector to be withdrawn, connected to a mating connector, and then retracted. A flexible printed cable is electrically connected between the conductors embedded in the molded member and a terminal board formed on one wall of the housing to enable extraction and retraction of the sleeve connector while maintaining electrical continuity between the sleeve connector and the terminal board.

Patent 3,157,829 Div. 8

INTEGRATING AMPLIFIER.
Navy-assigned Patent,
by Warren R. Wood. 17 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Amplifiers), (*Amplifiers, Patents), Direct current, Diodes (Semiconductors), Transistors, Transformers, Capacitors, Reliability (Electronics), Diodes.

The amplifier is for integrating a given number of pulses to give a D. C. output. A fail safe arrangement is provided so that there can be no output signal when any one of the individual elements fail. Components of the circuit include a double Zener diode, several diodes, a transistor, a Shockley diode, capacitors and several transformers.

Patent 3,157,834 Div. 8

SUBMINIATURE VARIABLE CAPACITOR.
Air Force-assigned Patent,
by William H. Kumm and William L. Letsch.
17 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Variable capacitors), (*Variable capacitors, Subminiature electronic equipment), (*Subminiature electronic equipment, Variable capacitors), Halocarbon plastics, Electron tubes, Electrodes, Capacitance, High frequency, Amplifiers.

The capacitor is for use in high frequency tuned circuits. It is useful in the neutralization of the interelectrode capacity of vacuum tubes in high frequency tuned amplifiers. Polytetrafluoroethylene, known as Teflon, is used to make several of the components of the capacitor.

Patent 3,157,847 Div. 8

MULTILAYERED WAVEGUIDE CIRCUITRY FORMED BY STACKING PLATES HAVING SURFACE GROOVES.
Navy-assigned Patent,
by Robert M. Williams. 17 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Waveguides), (*Waveguides, Circuits), Design.

The waveguide system is made up of interchangeable modular components of various shapes which are designed to be stacked in virtually any desired configuration to furnish a single waveguide or a plurality of waveguides as a single compact unit.

Patent 3,157,859 Div. 8, 30

ELECTRONIC ANALOG STORAGE DEVICE.
Navy-assigned Patent,
by Loyd C. Moore and Klaus J. Hecker. 17 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Computer storage devices), (*Computer storage devices, Analog computers), Electronic equipment, Electronic switches, Circuits.

The electronic circuit permits storage of an analog level for a long period of time. The circuit consists of two box-car circuits in series, each boxcar circuit consisting of a charging gate and storage capacitor circuit, and an electronic switch.

Patent 3,158,418 Div. 8

PIN CONTACT FOR PRINTED CIRCUIT BOARDS.
Navy-assigned Patent,
by Thomas L. Rush. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pins (Mechanical)), (*Pins (Mechanical), Printed circuits), (*Printed circuits, Electric connectors).

The pin contact is designed with a pair of extending portions, one of which is intended to pass through an aperture in the printed circuit board and to become aligned with that particular planar conductor which the contact pin in question is intended to electrically engage. The other of these extending portions is intended to be associated with one of a series of evenly space notches formed along that edge of the printed circuit board at which the series of planar conductors terminate. Following an insertion of the pin contact through these cut-out portions of the board, the contact is desplaced laterally (parallel to the board surface) so that one portion thereof 'locks' into the notch.

Patent 3,158,774 Div. 8

IMAGE ORTHICON FOCUSING COIL AND FIELD FLARING RING.
Air Force-assigned Patent,
by Joel F. Fleming and Daniel C. Buck. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Image orthicons), (*Image orthicons, Focusing), (*Image tubes, Image orthicons), Rings, Coils, Magnetic fields, Control, Sensitivity, Resolution.

A focusing arrangement is provided for a standard image orthicon tube. A ring or rings are inserted within the conventional focus coil to provide a predetermined pattern of the focus flux lines. The rings may be varied in shape.

Patent 3,158,780 Div. 8

VOLTAGE-TUNEABLE MAGNETRON.
Army-assigned Patent,
by Horst W. A. Gerlach. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Magnetrons), (*Magnetrons, Patents), Voltage, Tuning devices, Microwave amplifiers, Microwave oscillators, Maintainability, Design.

The voltage-tunable magnetron has components so arranged that if a component is faulty it may be quickly replaced. The discharge device can be employed either as an amplifier or as an oscillator.

Patent 3,158,815 Div. 8

BARKAUSEN OSCILLATION ELIMINATION MEANS.
AEC-assigned Patent,
by John P. Hoice and George L. Anderson. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Oscillators), (*Electron tubes, Oscillation), (*Oscillation, Damping), Resistors, Circuits, Diodes (Electron tubes), Anodes (Electron tubes), Voltage, Electrons, Corrections.

A dropping resistor is placed in series with the control grid of a multielement vacuum tube functioning as the active element of an electronic circuit, and a diode is connected between the anode of such vacuum tube and the series dropping resistor. The diode is oriented such that its forward bias condition occurs when the control grid tends to become positive with respect to the anode. During this period of diode conduction a finite negative grid potential with respect to the anode is established, the magnitude of which is dependent upon the voltage drop developed across the dropping resistor while grid current is flowing. This finite negative grid potential eliminates the possibility of unwanted electron oscillation.

Patent 3,158,817 Div. 8

FREQUENCY RESPONSIVE APPARATUS WITH DUAL OUTPUT FILTER.
Navy-assigned Patent,
by Donald M. Lauderdale. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radiofrequency filters), (*Radiofrequency filters, Patents), (*Discriminators, Radiofrequency filters), Phase detectors, Signal-to-noise ratio, Circuits.

The filter system provides sensitive frequency discrimination in systems having low signal-to-noise ratio. The dual output filter provides a dual signal useable in a Foster-Seeley type discriminator. The outputs of the dual output filter are inherently at a ninety degree phase relationship at the mid-frequency of the input signal.

Patent 3,158,818 Div. 8, 25

AUTOMATIC GAIN CONTROL SIGNAL TRANSLATING SYSTEM.
Navy-assigned Patent,
by David J. Plumpe. 24 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Amplifiers), (*Amplifiers, Automatic gain control), Semiconductors, Circuits, Sonar signals.

The normalizing amplifier is entirely automatic in operation and is preferably composed of semiconductor circuitry. The amplifier has accurately stepped gain control for near precise data recording of sonar signals and the like. The actual gain per stage and switching threshold can be changed to different values merely by changing the values of a few resistors.

Patent 3,158,825 Div. 8

MOVABLE RESONANT CAVITY TUNING PROBE IN DIELECTRIC SLEEVE HAVING NONUNIFORM OUTER SURFACE.
Commerce-assigned Patent,
by Maurice J. Vetter. 24 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Tuning devices), (*Tuning devices, Cavity resonators), Probes (Electromagnetic), Dielectrics, Frequency, Design, Surfaces.

The tuning device for a resonant cavity includes an envelope of dielectric material positioned in the cavity. The envelope has a plurality of surfaces, each defined by a respective line drawn parallel to and rotated around the longitudinal axis of the envelope. A probe may be selectively positioned in the envelope.

Patent 3,158,845 Div. 8

FREQUENCY COMPENSATING SYSTEM.
Navy-assigned Patent,
by Phillip S. Bengston. 24 Nov 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Discriminators), (*Discriminators), Recording systems), Signals, Frequency modulation, Magnetic tape, Telemeter systems, Pulse generators, Circuits, Voltage.

The system is for discriminating frequency modulated signals recorded on magnetic tape and, particularly, for eliminating wow and flutter introduced by the recorder playback apparatus. The tape recording is used in the telemetering systems. The discriminator circuit utilizes a pulse shaping circuit that produces a pair of pulses for every cycle of the applied input. One of the pulses actuates a saw-tooth generator and the other pulse actuates a sampling circuit. The sampling circuit samples the sawtooth voltage when energized and stores the sampled voltage from one cycle to another.

PB-166 583 Div. 8
OTS Prices: HC $1.00/None

Ellson (Douglas G.).

FREE STYLUS SWITCH FOR PRINTED CIRCUITS.
Disclosure of invention,
by Douglas G. Ellson. 4 Feb 63, 1p
Grant PHS HD00694

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electronic switches, Printed circuits), Teaching machines, Electrical conductance, Electric insulation.

A switch for printed circuits that is operated with a stylus not otherwise attached to the circuit is described. Applications are planned in teaching machines similar to electric question-and-answer games in which answers are indicated by closing an electric circuit by touching a contact with a stylus attached to a flexible wire. The device described eliminates the need for the wire connection.

9. Fluid Mechanics

AD-411 113 Div. 9, 12
OTS Prices: HC $4.00

Lockheed Missiles and Space Co., Sunnyvale, Calif.
AERODYNAMIC HEAT TRANSFER AND PRESSURE DISTRIBUTION ON BLUNT BODIES AT HYPERSONIC VELOCITIES: AN ANNOTATED BIBLIOGRAPHY.
Rept. for Jan 47-Oct 62,
comp. by Eugene E. Graziano. Dec 62, 113p
LMSC-8-40-62-7; SB-62-61
Contract NOw63 0050c
N63 18212

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Blunt bodies, Hypersonic flow), (*Aerodynamic characteristics, Bibliographies), (*Bibliographies, Aerodynamic characteristics), (*Heat transfer, Aerodynamic characteristics), (*Pressure, Aerodynamic characteristics), (*Hypersonic flow, Blunt bodies), (*Atmosphere entry, Reentry vehicles), Aerodynamic heating, Fluid dynamic properties, Spacecraft, Distribution, Abstracting.

The bibliography consists of 296 references to sources that contain theoretical and/or experimental data on aerodynamic heat transfer and pressure distribution over blunt bodies at hypersonic speeds. Blunt bodies of all shapes are included. All types of fluids at velocities greater than Mach = 5 were of interest. Materials that otherwise fell within these parameters were excluded if they did not specifically deal with pressure distribution or heat transfer. The purpose of the literature search was to provide a comprehensive background relating to the reentry of space vehicles. The period covered in the search was from January 1947 to October 1962. (Author)

PB-166 373 Div. 9, 15, 24
OTS Prices: HC $2.00/MF $0.50

Harvard Univ., Cambridge, Mass.
FLUID FLOW PATTERNS.
Final rept.,
by Garrett Birkhoff and Thomas E. Caywood.
1 Feb 47, 47p

Contract NOrd8555, Task B
NAVWEPS 447; AD 207 125

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fluid flow, Photographic analysis), (*Photographic techniques, Fluid flow), Velocity, Photography, Particles, Bubbles, Containers, Test methods, Hydrodynamics, Boundary layer, Spheres, Drag, Corrections, Partial differential equations.

Multiflash bubble technique: Various experimental techniques have been used to determine the fluid flow around objects. Some of these, namely, spark shadowgraph, schlieren and the interferometric techniques, are best adapted to gas flows. Although these techniques may be used to record three-dimensional motion, one must make extended calculations involving assumptions about various physical variables to obtain velocity fields in this case. The Pitot tube technique may be applied to both gas and liquid flows but it is not well adapted to recording transient velocity fields. Many other observational techniques are either primarily qualitative or give only flow directions in the boundary layer. Some techniques are especially suited to liquids. Among these is the birefringent suspension technique, but here again the velocity field may not be obtained immediately. Photographic methods have been used to measure velocity fields directly in moving liquids. These include the time exposed photographs of illuminated particles suspended in the liquid.

PB-166 571 Div. 9
OTS Prices: HC $3.00/MF $0.75

Electronics Research Labs., Columbia Univ., New York.
A STUDY OF THE STRUCTURE OF SHOCK WAVE FRONTS.
Final rept. F/148.,
by I. Horiuchi. 31 Jul 60, 67p CU-4-60-AF-1897
Contract AF30 602 1897
RADC TR60 232; AD 247 661

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Shock waves, Analysis), Propagation, Shock tubes, Transducers, Sparks, Velocity, Gas discharges, Measurement, Test methods, Test equipment, Theory.

A summary of the results obtained in the 'study of the structure of shock wave fronts' is presented. A brief theoretical discussion is first given, followed by a description of the apparatus and measurement techniques employed. Data are presented on the results obtained for shock wave propagation in a three-inch shock tube. Velocities to Mach 6 were attained. Measurements of shock wave velocity decrement and shock front attenuation, employing the gold-film technique and quartz pressure transducers, respectively, show that after a high initial gradient, the attenuation reaches a rate dependent upon the nature of the bounding surfaces and the ambient gas pressure. By adopting an empirical expression for the effect of the boundaries, the attenuation due to the gas alone is obtained; this is shown to follow an inverse square root dependence. (Author)

PB-166 579 Div. 9, 31
OTS Prices: HC $2.00/MF $0.50

Institute of Engineering Research, Univ. of California, Berkeley.

LOADS ACTING ON A SHIP IN A SEAWAY,
by O. J. Sibul. Jun 64, 34p NA 64-5
Contract MA2620, Task 4

Unclassified report

Descriptors: (*Hydrodynamics, Ship hulls), (*Ship hulls, Hydrodynamics), (*Marine engineering, Hydrodynamics), Ships, Ship structural components, Hydrostatic pressure, Loading (Mechanics), Ocean waves, Force (Mechanics), Moments, Deformation, Theory, Experimental data.

Contents:
Hydrodynamic forces
Bending moments
Impact and High-frequency loads slamming
Irregular waves.

10. Fuels and Combustion

Patent 3,154,285 Div. 10, 1, 12, 22

FUEL DERICHMENT VALVE.
Navy-assigned Patent,
by Omer Houle. 27 Oct 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Valves), (*Valves, Fuel systems), Guided missiles, Launching, Jet planes, Electromagnets, Rockets.

The valve is adapted for use with missile launching jet aircraft to prevent the injection of excess fuel into the combustion chamber during a missile launching operation. The unitary structure includes an electromagnet assembly and a valve assembly which are interposed in the pressure fluid distributing system so that fuel may be delivered to the combustion chamber according to the position of the valve.

Patent 3,154,378 Div. 10, 4

PROCESS FOR PREPARING URANIUM MONOCARBIDE.
AEC-assigned Patent,
by Alfred Schneider, Leslie Burris, Jr., and Stephen Lawroski. 27 Oct 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Carbides), (*Uranium compounds, Carbides), (*Carbides, Preparation), Reactor fuels, Refractory materials, Metals, Chemical precipitation, Solutions, Carbon, Synthesis (Chemistry).

Uranium monocarbide is produced by dissolving uranium in a molten solvent metal such as cadmium and zinc at between 500 and 850 degrees C. and introducing finely divided carbon into the solution. Uranium monocarbide is formed, precipitated and separated out from the solution.

Patent 3,154,379 Div. 10

PLUTONIUM SEPARATION FROM URANIUM AND LANTHANIDES BY PRECIPITATION FROM MOLTEN CHLORIDE SOLUTIONS.

AEC-assigned Patent,
by Glen E. Benedict and John L. Swanson. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Plutonium, Separation), (*Reactor fuel processing, Patents), Chemical precipitation, Plutonium compounds, Dioxides, Mixtures, Reactor fuel elements, Uranium compounds, Rare earths, Chlorine, Lanthanum compounds, Salts, Chlorides, Solutions, Solvents, Reactor fuels.

The process is for recovering plutonium dioxide from a chlorinatable mixture containing uranium, plutonium and lanthanide rare earths. The mixture is obtained from nuclear fuel elements. The process includes dissolving the mixture in a fused salt such as a lithium chloride-sodium chloride mixture and sparging with chlorine gas while introducing oxygen. Plutonium precipitates as plutonium dioxide.

Patent 3,154,500 Div. 10

STRONTIUM RECOVERY PROCESS.
AEC-assigned Patent,
by George Jansen, Jr., Gerald L. Richardson, Allison M. Platt, and Lane A. Bray. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Strontium, Reactor fuel processing), (*Reactor fuel processing, Patents), Radioactive isotopes, Solvent extraction, Ion exchange resins, Ion exchange, Adsorption, Separation.

Radioactive strontium is recovered from aqueous solutions by a combined solvent extraction-ion exchange adsorption process. The cation exchange resin is used at the tail end of the process instead of at the head end.

Patent 3,156,594 Div. 10, 22

POLYMERIC BASE PROPELLANT COMPOSITIONS CONTAINING LITHIUM FLUORIDE CATALYST.
Navy-assigned Patent,
by Marvin D. Horton. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Solid rocket propellants), (*Solid rocket propellants, Patents), Ammonium compounds, Perchlorates, Burning rate, Catalysts, Lithium compounds, Fluorides, Solid rocket oxidizers, Solid rocket propellant binders, Acrylic resins, Epoxy plastics.

The rocket propellant composition consists of ammonium perchlorate, lithium fluoride, polybutyl acrylic acid terpolymer and a resin consisting of a condensation product of epichlorohydrin and bisphenol A.

11. Ground Transportation Equipment

No Entries

12. Guided Missiles

Patent 3,153,979 Div. 12

MISSILE LAUNCHING ASSEMBLY.
Navy-assigned Patent,
by Roy W. Villers. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Guided missile launchers), (*Guided missile launchers, Underwater equipment), (*Guided missiles (Underwater-to-surface), Guided missile launchers), Guided missiles components, Fins, Buoyancy, Guide vanes, Containers.

The assembly is for launching a missile with fins from a body of water. The base member for supporting the missile is provided with guides having buoyant material between them. The guides are spread apart as the missile becomes independent of the launching device.

Patent 3,153,980 Div. 12

RETRACTABLE MISSILE SHOES.
Navy-assigned Patent,
by Sverre Kongelbeck. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Guided missile components), (*Guided missile components, Suspension devices), (*Suspension devices, Guided missile components), Guided missile launchers, Guided missiles (Surface-to-air), Supports.

The retractable shoes support an aerial missile and a shipborne launcher. An assembly is provided wherein a pair of shoes is pivotally mounted on a common pin. The shoes are locked in retracted position after launching of the missile.

Patent 3, 154,093 Div. 12

FUEL PRESSURIZATION SYSTEM.
Navy-assigned Patent,
by Charles M. Blackburn and John Dassoulas. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fuel systems), (*Fuel systems, Guided missiles (air-to air)), (*Pressure vessels, Fuel tanks), (*Fuel tanks, Pressure vessels), Conveyors, Valves, Center of gravity, Control, Pressure regulators, Liquid rocket fuels.

Three tandem arranged fuel tanks for a missile are emptied sequentially to maintain the center of gravity. Each tank is connected to a common source of pressurized gas, the connection to the forward tank being unrestricted and the connections to the remaining tanks having pressure responsive valves therein. Fuel is forced from the forward tank by the pressurized gas until the tank is empty, at which time the pressure valve in the connection to the second tank will open to admit gas therein. Gas is similarly admitted to the aft tank after the second tank has been exhausted of fuel.

Patent 3,154,265 Div. 12

CONTROL SYSTEM FOR AUTOMATIC SOFT LANDING OF A ROCKET VEHICLE.
Navy-assigned Patent,
by Charles E. Hendrix, Paul C. Driver, and Donald D. Stevenson. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Landing gear), (*Landing gear, Spacecraft), (*Spacecraft, Landing gear), Lunar probes, Soft landings, Flight control systems, Controllable-thrust rocket.

A variable-thrust rocket motor is used for achieving automatic soft landing of a space vehicle on the surface of the moon. An optical scanner measures the ratio of the velocity of approach and height above the landing surface and then adjusts the thrust of the rocket motor so that this ratio is held constant, thus assuring that both velocity and height become zero simultaneously, which is the definition of a soft landing.

Patent 3,154,266 Div. 12

AIRCRAFT CONTROL SYSTEM.
Navy-assigned Patent,
by Thomas W. Sheppard and Ben E. Amsler.
27 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flight control systems), (*Flight control systems, Guided missiles), (*Guided missiles, Flight control systems), Guidance.

The steering control system is for a guided missile. The system is used in steering the missile on a target intercept path. The system is associated with the wing actuator of the missile and includes an antenna, a beam rider receiver, a computer, a variable gain device, a servo amplifier, a wing actuator, an accelerometer, a comparing circuit, an integrator and a position servo which functions to adjust the gain of the variable gain device.

Patent 3,155,992 Div. 12

LIFE RAFT.
NASA-assigned Patent,
by Glenn A. Shewmake and Matthew I. Radnofsky.
10 Nov 64
Unclassified patent

Available from the Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Life rafts), (*Life rafts, Space crews), Inflatable structures, Spacecraft, Textiles, Radar reflectors, Storage, Safety devices.

The inflatable life raft is designed as survival equipment for personnel landing in a space craft. It is made of light weight fabric and has fabric ballast buckets on its underside. It is provided with boarding handles across its floor. The raft has a radar-reflective covering which is stored in a reefed condition.

Patent 3,156,851 Div. 12, 27

TIMING MECHANISM.
AEC-assigned Patent,
by William C. Monday. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Timing devices), (*Timing devices, Guided missile components), (*Guided missile components, Timing devices), Control systems, Rocket propulsion, Engine fuel systems components.

The timing mechanism is used in missile propulsion or control systems, for example, with a rocket motor to control the time of fuel flow. The mechanism includes a double trip element arrangement and a differential gearing assembly for attaining a desired timing gear.

Patent 3,158,336 Div. 12, 1

ASSEMBLY FOR RECOVERING A CAPSULE.
NASA-assigned Patent,
by Alfred P. Warren and Billy D. Lawson. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reentry vehicles), (*Reentry vehicles, Recovery), (*Recovery, Space capsules), (*Space capsules, Recovery), Rockets, Payload, Ejection, Stabilization systems, Deceleration, Flaps, Specifications.

Capsule assemblies are associated with a rocket having an upper and a lower stage. The capsule assembly includes a storage arrangement for storing a capsule prior to its recovery, an ejector device for ejecting the capsule, a plurality of stabilizing and decelerating flaps, and a device for opening and locking the flaps.

PB-166 584 Div. 12, 30
OTS Prices: HC $1.00/None

Keighley (Geoffrey).
THE CALTECH PUMP. FLUID TRANSFER MEANS AT ZERO 'G'.
Invention rept.,
by Geoffrey Keighley. 19 Aug 64, 1p
Grant PHS HE07683
Unclassified report

Descriptors: (*Centrifugal pumps, Space environmental conditions), (*Fluid flow, Space environmental conditions), (*Weightlessness, Fluid flow), Centrifuges, Pumps, Gravity (Artificial), Spacecraft, Orbital trajectories, Fluid mechanics.

Two containers, A and B, are coupled together by two tubes which are inserted deeply into one container and shallowly into the other. Consider the containers to be standing vertically, on earth. B contains liquid. If the containers are inverted the liquid will flow from B into A. In a gravity free field, as in an orbiting vehicle, containers can be coupled together in this fashion to transfer liquid, all or part, from one container to another. The coupled pair should beplaced in a sling which could be held in one hand and whirled around or on a pivoted arm which could be used as a simple centrifuge, and pushed around the pivot with a finger or hand. The containers to lie along a radius with the empty or receiver the most distant from the center of rotation. With a radius of only a few inches

it is easy to achieve the low RPM needed to produce accelerations of 1 G or more. Size is not important. The equipment needed, besides the containers, could be light, is uncomplicated and easy to operate and understand. It could be used for a variety of operations, including the transfer of liquid samples in order to make chemical, biochemical and physiological tests. (Author)

13. Installations and Construction

Patent 3,157,931 Div. 13

BACKING PLATE HANGER.
Army-assigned Patent,
by Cornelius J. McKeown. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Clamps), (*Clamps, Suspension devices).

The clamp is used with a galvanized iron can having a beaded upper rim to support an immersion heater. The clamp structure includes a bifurcated body of sheet metal which has an inner leg and an outer leg which are connected by a bight which rests atop the rim of the can. The heater is supported on the inner leg and bight.

Patent 3,157,932 Div. 13

QUICK RELEASE CLAMP.
Air Force-assigned Patent,
by Gilbert M. Kyrias. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hose couplings), (*Clamps, Hose couplings), (*Hose couplings, Clamps), Disconnect fittings, Fastenings, Hose fittings, Locking fastener devices.

The quick release clamp is for a hose. The mechanism includes two semicircular clamping members, a hinge member, a latch, a toggle link and a toggle mechanism having a toggle locking member and a toggle link member.

Patent 3,158,031 Div. 13, 14

RECOVERY OF DRY CHEMICAL FIRE EXTINGUISHING POWDERS USED FOR TEST PURPOSES,
Navy-assigned Patent,
by Raymond R. Neill. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fire extinguishers), (*Fire extinguishers, Test methods), (*Powders, Containers), Collecting methods, Tests, Materials, Design.

The container is for recovering the dry powder expelled from a portable fire extinguisher during testing. The apparatus includes a square container and an inflatable cover which is secured to the upper part of the container. The container has a slide door at the bottom.

Patent 3,158,457 Div. 13, 16, 26

ULTRA-CLEAN ROOM.
AEC-assigned Patent,
by Willis J. Whitfield. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Controlled atmospheres), (*Buildings, Controlled atmospheres), (*Controlled atmospheres, Buildings), Ventilation, Decontamination, Dust, Air pollution, Gas filters, Design.

The clean room is designed for industry use. It operates by circulating a large amount of air (about ten changes of air per minute) through the room in such a manner that the incoming air performs a 'sweeping' function over the working areas.

PB-166 582 Div. 13, 2, 33
OTS Prices: HC $1.00/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
BEACH SAND STABILIZATION - THERMITE METHOD.
Final memo.,
by J. E. Halton and E. R. Holden. 25 Aug 50, 11p
Proj. NY140 001 4
NCEL M011
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Beaches, Trafficability), (*Thermite, Combustion), (*Sand, Stabilization), Soil mechanics, Engineering geology, Terrain, Tests, Reliability.

Although satisfactory beach-sand stabilization has been accomplished by means of thermite when used under carefully controlled and ideal conditions, many serious difficulties have been encountered in various tests. Satisfactory results are not obtained when the terrain is not level because the thermite layers will not burn uphill. Small inclines cause the molten phase to puddle. Self-extinguishment results, apparently due to insufficient heat transfer. Discontinuous and incomplete combustion is caused also by other factors. Four field tests were carried out to acquire specific information on the following: (a) A reliable procedure that will result in uniform and complete combustion. (b) The extent to which the excessive quantities of some of the materials used in previous tests may be reduced.

14. Materials (Non-Metallic)

CAPE-1113 Div. 14

Dow Chemical Co., Denver, Colo.
FORCE TRANSMITTING SEAL.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Seals (Stoppers), Mechanical drawings), (*Diaphragms, Seals (Stoppers)), Transport properties, Force (Mechanics), Balances.

Two drawings of a seal used for transmitting a force such as that from a density balance through a dry box are included. Directions are given for using the seal with a Toledo scale. Individual titles are presented in the Engineering Materials List (TID-4100). (AEC Abstract)

CAPE-1151 Div. 14, 20

Lawrence Radiation Lab., Univ. of California, Berkeley.
MYLAR FLASK.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Containers, Mechanical drawings), (*Particle accelerator targets, Containers), (*Polyethylene plastics, Containers), Particle accelerator components, Plastics, Films, Particle accelerators, Hydrogen.

Drawings (2) are presented of a container for a liquid-hydrogen accelerator target. The flask walls are of 5-mil Mylar sheet, and the domes of the flask are formed in a mold under a combination of heat and pressure. Individual titles are given in the Engineering Materials List (TID-4100). (AEC Abstract)

OTR-107 Div. 14
OTS Price: $0.50

National Bureau of Standards, Washington, D. C. Inst. for Applied Technology.
CONCRETE TECHNOLOGY.
Dec 64, 29p Unclassified report

Descriptors: (*Bibliographies, Concrete), (*Concrete, Reports), Abstracting, Compressive properties, Cements, Shock (Mechanics), Stresses, Corrossion, Reinforced concrete, Reinforcing materials, Coatings, Protective treatments, Loading (Mechanics), Beams (Structural), Asphalt, Epoxy plastics, Moistureproofing, Corrosion inhibition, Permeability, Plastis, Fibers (Synthetic), Weight.

Significant reports covering the period since 1962 were selected for this study, with reference to relevant earlier works. Recent government R and D in concrete technology has generally proceeded along five lines: increased strength of portland cement concrete in routine production, shock reduction applications of lightweight vermiculite concrete, reduction of corrosion in reinforced concrete, studies of stresses and their relaxation in prestressed concrete, protection of concrete from water transmission by means of protective coatings, and improvement of shock resistance of cement mortar and asphalt-concrete by the addition of epoxy resins. This research should offer leads to new applications for stronger, more lightweight, more shock resistant, or less permeable concrete pavements and structures. (Author)

Patent 3,154,373 Div. 14

PROCESS FOR TREATING CELLULOSIC TEXTILES WITH FORMALDEHYDE IN VAPOR FORM.
Agriculture-assigned Patent,
by John D. Guthrie. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Textiles), (*Textiles, Cellulose), (*Cotton textiles, Processing), (*Rayon, Processing), Mechanical properties, Surface properties, Formaldehyde, Cellulose acetates, Vapors.

Cellulosic textile materials are exposed to a low concentration of the vapor of formaldehyde containing a small concentration of a volatile strong acid catalyst. The textiles have good 'wash-wear' characteristics.

Patent 3,154,497 Div. 14

METHOD OF IMPROVING THE STORAGE PROPERTIES OF ALKALINE DETERGENT COMPOSITIONS.
Army-assigned Patent,
by Abraham Mankowich. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Cleaning compounds), (*Cleaning compounds, Storage), Sodium compounds, Silicates, Phosphates, Coatings, Preservation, Stability, Hydrates, Glycols, Ethers.

The non-caking storage stable alkaline detergent composition contains 52.5 percent sodium tripolyphosphate (by weight), 35 percent sodium metasilicate pentahydrate, and 10.5 percent sodium primary phosphate monohydrate coated with 2 percent octyl pheyl poly-(9, 10)-ethylene glycol ether.

Patent 3,156,522 Div. 14, 4

TREATMENT OF WOOL WITH ISOCYANATE-EPICHLOROHYDRIN MIXTURES.
Agriculture-assigned Patent,
by Nathan H. Koenig. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Woolen textiles), (*Woolen textiles, Antioxidants), Halogenated hydrocarbons, Oxides, Isocyanic acid, Chemical reactions, Aliphatic compounds.

The treated wool is resistant to oxidizing conditions. The wool is reacted, under anhydrous conditions, with a mixture containing 5 to 95 percent by weight of epichlorohydrin and 95 to 5 percent of an aliphatic isocyanate or chlorophenyl isocyanate.

Patent 3,157,460 Div. 14, 4

PROCESS OF CYANOETHYLATING COTTON FIBERS AND GRAFT POLYMERIZING THERETO ACRYLONITRILE WITH IONIZING RADIATION.
Agriculture-assigned Patent,
by Jett C. Arthur, Jr., and Robert J. Demint.
17 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Cotton textiles), (*Cotton

textiles, Processing), Acrylonitrile polymers, Fibers (Natural), Polymerization, Radiation chemistry, Zinc compounds, Chlorides.

The treated cotton fibers exhibit decreased stiffness and increased elongation-at-break. The fibers are cyanoethylated and padded with a solution containing acrylonitrile monomer and zinc chloride. The fibers are then irradiated and washed.

Patent 3,157,529 Div. 14, 12

BONDED SOLID LUBRICANT COATING.
NASA-assigned Patent,
by Harold E. Sliney. 17 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Lubricants), (*Lubricants, Bonding), (*Solids, Lubricants), (*Coating, Lubricants), Calcium compounds, Fluorides, Binders, Cobalt compounds, Barium compounds, Boron compounds, Oxides, Reentry vehicles, Ceramic materials, Films.

The lubrication is especially suited for use in re-entry vehicles. The lubricant is made of calcium fluoride and a binder containing CoO, BaO, and B2O3.

Patent 3,157,676 Div. 14, 4

PROCESS FOR OBTAINING TRIVERNOLIN.
Agriculture-assigned Patent,
by William E. Scott and Jesse S. Ard. 17 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fatty acid esters), (*Fatty acid esters, Preparation), (*Plasticizers, Preparation), Seeds, Solvent extraction, Hydrolysis, Enzymes, Inhibition, Heat treatment, Organic solvents, Chemical precipitation, Recrystallization, Vinyl plastics, Stabilization.

Trivernolin is used as a plasticizer-stabilizer for polyvinyl resins. It is obtained from the seed of Vernonia anthelmintica Willd by a process comprising preventing enzymatic hydrolysis of trivernolin prior to its extraction from the seed, preparing the seed for solvent extraction, extracting trivernolin from the prepared seed with a suitable solvent such as petroleum ether, and separating the trivernolin from the extract.

Patent 3,157,718 Div. 14, 20, 26

METHOD OF SINTERING CERAMIC SHAPES.
AEC-assigned Patent,
by William J. O'Leary and Eugene A. Fisher.
17 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Sintering), (*Sintering, Reactor system components), (*Reactor system components, Sintering), (*Ceramic material forming, Processing, Extrusion, Reactor fuel rods, Cermets.

The method is for shaping extruded rod, tube or other shapes of ceramic cermet and nuclear fuel elements. The extruded material is fired or sintered with two initial supports from below along lines parallel with the axis of the shape and symmetrically spaced about the lower half of its circumference, and as the firing progresses and the diameter of the shape decreases due to shrinkage, a third support is provided along the lowest line of its circumference.

Patent 3,158,493 Div. 14

ADHESIVE COMPOSITION AND METHOD.
Army-assigned Patent,
by Louis Long, Jr., and Erik Vis. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Adhesives), (*Adhesives, Plastics), (*Expanded plastics, Patents), Sucrose, Plasticizers.

The compositions are useful as adhesives and cellular plastics. The composition consists of tetra-O-p-tolylsulfonyl-sucrose plasticized with sucrose acetate isobutyrate.

PB-166 337 Div. 14, 10, 20
OTS Prices: HC $2.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N.Y.
CRITICAL RADIANT EXPOSURES FOR PERSISTENT IGNITION OF CELLULOSIC TARGET COMPLEX MATERIALS.
Final rept.
by J. Bracciaventi and F. DeBold. 7 Jul 60, 40p
NASL 5046 3 P124, DASA 1194
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cellulose, Ignition), (*Thermal radiation, Cellulose), Nuclear explosions, Simulation, Newspapers, Cotton textiles, Rayon, Fiberboard, Textiles, Combustion, Wind, Moisture, Humidity.

Threshold radiant exposures for ignition of eight kindling materials were measured for simulated nuclear weapon pulses of thermal radiation. The effect of wind and moisture content on ignition was also measured. The distances for threshold ignition of six cellulosic kindling materials (black alpha cellulose, newsprint, fiberboard, cotton, and rayon) ranging in color from dark brown to black averaged 1.5 miles for a 50 kt burst, and 10.5 miles for a 10 Mt burst. For two materials, white and pale buff in color (white alpha cellulose and dry cheat grass) the distances for threshold ignition averaged 0.9 miles for a 50 kt burst and 6 miles for a 10 Mt burst. Winds up to 10 miles per hour caused differences in radiant exposures for ignition up to 50 percent, and conditioning at relative humidities from 20 to 100 percent changed ignition exposures by 70 percent. (Author)

15. Mathematics

PB-166 574 Div. 15, 12
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
LAGRANGE'S EQUATIONS FOR MOVING COORDINATES,

by William T. Thomson. 29 Jul 59, 12p
STL/TR-59-0000-00768; STL-EM-9-15
AD 222 914

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Partial differential equations, Motion), (*Motion, Partial differential equations), (*Guided missiles, Motion), Numerical analysis, Center of mass, Velocity, Acceleration, Differential equations.

In the dynamical study of flexible missiles, it is advantageous to use a set of coordinates moving with the missile. The motion of the various parts of the missile, considered as a system of particles, is then the vector sum of the motion relative to the moving coordinate system, and the motion of the moving axes. Having employed a set of moving coordinates, a choice exists as to the position of its origin relative to the system of particles, and the orientation of the axes. For instance, the center of mass of the system of particles may be chosen as the origin, and the axes may be oriented to make the relative angular momentum about the center of mass of a part of the system or any other convenient point and the axes oriented in any other manner. Thus the position of the moving axes is arbitrary and the appearance of the equations of motion will differ with this choice. The equations of motion are most conveniently set up by means of Lagrange's equations. However, for moving axes the form of Lagrange's equations are different from the usually known form. This report contains a derivation of Lagrange's equations for moving coordinates and clarifies the use of the usual form for the generalized coordinates for the relative coordinates. (Author)

16. Medical Sciences

Patent 3,157,637 Div. 16, 4

METHOD OF SEPARATING NUCLEOTIDES.
AEC-assigned Patent,
by Joseph X. Khym. 17 Nov 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nucleotides), (*Nucleotides, Separation), Adenosine phosphates, Phosphates, Amines, Salts, Acetates, Formates, Chlorides, Sulfates, Purification, Solvent extraction.

The method of separating at least one nucleoside selected from the group consisting of di-, tri- and tetra-phosphates of adenosine, uridine, cytidine, and guanosine from an aqueous solution includes the steps of providing the aqueous solution with anions of a water-soluble salt, contacting the resulting anion-containing solution with a substantially water-immiscible organic solution comprising an organic diluent and a primary aliphatic amine salt, and separating the resulting nucleotide-containing solution from the aqueous solution.

Patent 3,158,626 Div. 16, 3, 4

3-THIOSTEROIDS AND METHOD OF PREPARATION.
Army-assigned Patent,
by Clarence G. Stuckwisch and Nathan F. Blau.
24 Nov 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Steroids), (*Steroids, Synthesis (Chemistry)), (*Cholesterol, Inhibition), (*Antimetabolites, Preparation), Organic sulfur compounds, Biosynthesis, Liver, Thiols, Sulfonates, Chlorides.

The derivatives are anti-metabolites for cholesterol in physiological processes. The 3-thio derivatives of cholesterol having a specific formula are obtained by directly reacting a mercaptan from the lower alkyl group and an aryl mercaptan with a cholesteryl arylsulphonate.

Patent Design 199,504 Div. 16, 30

MICROSCOPE SLIDE HOLDER.
Army-assigned Patent design,
by Elmo Maiolatesi. 3 Nov 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Microscopes), (*Microscopes, Laboratory equipment), Medical supplies, Cylindrical bodies.

The slide holder is in the form of a cylinder with twenty slots cut partially through the cylinder along its length. Each slot holds a slide. The cylinder has two grooved cuts diametrically opposite to the slotted cuts. Each of these two grooved cuts has a small tube adhered to it to support the cylinder.

PB-166 540 Div. 16, 32
OTS Prices: HC $2.00/MF $0.50

Center for Documentation and Communication Research, Western Reserve Univ., Cleveland, Ohio.
DOCUMENTATION OF DISEASE VECTOR CONTROL LITERATURE AND LITERATURE ON VECTOR-BORNE DISEASES, ZOONOSES AND MYCOSES.
Progress rept. no. 4, Oct 60-Feb 62,
by Allen Kent, A. J. Goldwyn, and Jessica S. Melton.
19 Feb 62, 47p
Grant PHS E2913

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Disease vectors, Documentation), (*Documentation, Disease vectors), (*Communicable diseases, Documentation), Animals, Insects, Fungi, Diseases, Insect control, Insecticides, Abstracting, Storage, Dictionaries, Coding, Bibliographies, Information retrieval.

The current project in the documentation of disease vector control literature and the literature on vector-borne diseases, zoonoses, and mycoses has resulted in the analysis and preparation of telegraphic abstracts for 3,146 documents; the editing for tape of 2,521 telegraphic abstracts; and the recording of 2,445 coded telegraphic abstracts on magnetic tape. Techniques have been developed in the areas of question analysis, search programming, and evaluation of output. Depth and usefulness of literature analysis have been increased considerably. A code dictionary has been prepared containing more than 10,000 entries, each recorded in terms of the

biomedical concepts which it represents. Seventy-seven questions formulated by members of the Communicable Disease Center Documentation Committee have been searched and a total of 1,281 responses have been evaluated by the Committee. The Center for Documentation and Communication Research has been able to make further refinements in its methods and system, based on this feedback, combined with the experience gained in the analysis, coding, recording, searching, and evaluating of a growing file. (Author)

17. Metallurgy

AD-451 039 Div. 17, 26
OTS Prices: HC $3.00

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
RESEARCH ON REFRACTORY ALLOYS OF TUNGSTEN, TANTALUM, MOLYBDENUM, AND COLUMBIUM.
Summary rept. for 1 Jul 63-30 Jun 64,
by Lawrence J. Stefan, Frank N. Lake, and Charles R. Cook. Sep 64, 54p
Contract AF33 657 11239, Proj. 7351, Task 735101
ML TDR64 271

Unclassified report

Descriptors: (*Refractory metal alloys, Metallurgy), (*Tungsten alloys, Metallurgy), Tantalum alloys, Molybdenum alloys, Niobium alloys, Solid solutions, Castings, Centrifugal casting, Extrusion, Microstructure, Grain structures (Metallurgy), Recrystallization, Tensile properties, Rolling (Metallurgy), Sheets, Vanadium alloys, Zirconium alloys, Carbon alloys, Rods, Forging, Contamination, Melting, Vacuum.

Experimental efforts directed toward development of the 68%W-20%Ta-12%Mo solid solution strengthened high temperature alloy have been successful. Efforts thus far have indicated that ingots of the alloy can be prepared by centrifugal casting techniques using uniquely designed molds, and can be extruded at ultra-high temperatures to sound bar stock. Microstructures in both the as-cast and the extruded conditions are shown to consist of single phase, fine grains which appear ideal for further processing. The 1 hour-100% recrystallization temperature has been determined to be 3300F for the extruded stock. The 3000, 3500, and 4000F tensile strengths determined from extruded stock after recrystallization are approximately 3 times those of unalloyed tungsten and are believed to be the highest reproducible tensile strengths of recrystallized material measured to date across this temperature range. Preliminary rolling studies have been conducted and are being continued toward the production and testing of sheet products of the alloy. The initial centrifugal casting attempt with the W-12%Cb-0.29%V-0.12%Zr-0.07%C dispersed phase strengthened alloy has been scheduled. (Author)

Patent 3,156,558 Div. 17

HIGH-DENSITY, NONMAGNETIC STAINLESS STEEL.
Commerce-assigned Patent,
by Samuel J. Rosenberg and Thomas P. Royston, Jr.
10 Nov 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Stainless steel), (*Stainless steel, Permeability (Magnetic)), Density, Metallurgy, Chromium alloys, Nickel alloys, Tungsten alloys, Carbon alloys, Manganese alloys, Phosphorus alloys, Sulfur, Silicon alloys.

The steel contains mainly iron, 15.5 to 17.5 percent chromium, 31.5 to 33.5 percent nickel, 9.0 to 10.0 percent tungsten and smaller amounts of carbon, manganese, phosphorus, sulfur and silicon.

18. Military Sciences and Operations

No Entries

19. Navigation

No Entries

20. Nuclear Physics and Nuclear Chemistry

AD-413 566 Div. 20, 17
OTS Prices: HC $3.00

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MAGNETIC SCATTERING OF NEUTRONS BY HEXAGONAL COBALT.
Doctoral thesis,
by R. M. Moon, Jr. 9 May 63, 55p LL-TR-312
Contract AF19 628 500

Unclassified report

Descriptors: (*Cobalt, Nuclear magnetic moments), (*Neutron scattering, Cobalt), Crystallography, Magnetism, Neutron beams, Polarization, Single crystals, Nuclear spins, Electrons, Anisotropy, Elastic scattering, Transition elements, Metals, Ferromagnetism, Neutron diffraction analysis, Mosaics (Light-sensitive), Reflection, Temperature, Spheres, Fourier analysis, Equations, Integral equations, Differential equations, Statistical functions, Geometry, Single crystals.

The magnetic form factor of hexagonal cobalt has been determined by measuring the coherent scattering of a polarized neutron beam from single crystal samples. The results indicate a nearly spherical 3d-like distribution of positive magnetic moment, superimposed on a diffuse distribution of negative moment. This conclusion follows directly from a Fourier inversion of the experimental results and is confirmed by an analysis of the results in terms of calculated free atom form factors. The shape of the spin distribution is very close to the calculated free atom 3d spin distribution. Interpreting the negative moment as a spin polarization of the conduction electrons, the total moment per atom is composed of the following parts: 3d spin, +1.86 mu sub B;

conduction spin, -0.28 mu sub B; 3d orbital, +0.13 mu sub B. The form factor showed no dependence on temperature between 78K and 300K. The coherent nuclear scattering amplitude of cobalt was found to be (0.250± 0.002) 10 to the minus 12th power cm. (Author)

CAPE-1066 Div. 20, 21

Union Carbide Nuclear Co., Oak Ridge, Tenn.
MOLTEN SALT PUMPS, DANA.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Centrifugal pumps, Mechanical drawings), (*Liquid metal pumps, Reactor system components), (*Reactor system components, Centrifugal pumps), (*Nuclear engineering, Liquid metal pumps), Pumps, Aircraft, Nuclear reactors, Salts, Liquid metals, Aircraft nuclear propulsion.

Drawings (49) are presented for sump-type centrifugal pumps used in the Aircraft Reactor Experiment. The capacity of the pumps is 150 gpm with a head of 300 ft at 3750 rpm. The fluid pumping power is 8.7 and 23 hp for NaK and LiF-BeF2-UF4, respectively, at 1200F. Individual titles are given in the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1095 Div. 20, 30

Oak Ridge National Lab., Tenn.
MODULAR REACTOR INSTRUMENTATION.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Nuclear reactors, Instrumentation), (*Reactor power density, Measurement), Mechanical drawings, Reactor safety systems, Reactor control.

Drawings are presented for the wide-range counting instrument, which measures reactor power; the safety channel of the High Flux Isotope Reactor (HFIR), which controls scram latches; the regulation channel of the HFIR, which uses one control rod; and the PCP II multisection ionization chamber, which is neutron sensitive with one compensated and one uncompensated section used for control or safety functions. (AEC abstract)

CAPE-1131 Div. 20

Oak Ridge National Lab., Tenn.
PORTABLE ALPHA SCINTILLATION DETECTOR/Q-2101/.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Alpha particle detectors, Mechanical drawings), Alpha counters, Scintillation counters, Photomultipliers, Probes (Electromagnetic), Portable, Phosphorescent materials, Zinc, Sulfides, Aerylic resins.

Drawings (4) are presented for a large-area, alpha-survey probe using an RCA 6655 2-in. photomultiplier tube and silver-activated zinc sulfide phosphor. The phosphor is deposited with a thickness of 20 mg/sq cm on a Lucite plate, which is the light piper. Individual titles are given in the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1146 Div. 20

Oak Ridge National Lab., Tenn.
BEAM CONTROL FOR THE ACCELERATOR PROGRAM.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Electron beams, Control systems), (*Particle accelerators, Electron beams), Mechanical drawings.

Drawings (20) are presented for beam control mechanisms used with 3-Mev, 5-Mev, and Tandem Van de Graaff accelerators, including tubes, viewers, slits, clippers, cups, cold traps, strippers, pulse pickups, and deflectors. Individual titles are given in the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1148 Div. 20

Oak Ridge National Lab., Tenn.
PORTABLE ALPHA COUNTER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Alpha counters, Mechanical drawings), Radiation measurement systems, Scintillation counters, Alpha particle detectors, Portable.

Drawings (6) are presented for a scintillation counter that detects low-level alpha contamination. Individual titles are given in the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1154 Div. 20

Du Pont de Nemours (E. I.) and Co., Inc., Savannah River Lab., Aiken, S. C.
MULTI-STAGE CENTRIFUGAL CONTACTOR.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Solvent extraction, Uranium), (*Uranium, Solvent extraction), Centrifuge separation, Centrifuges, Nitric acid, Water, Solution, Organic solvents.

Drawings (44) are presented for a six-stage contactor that processes natural or enriched uranium solutions by solvent extraction. The stages are 10 in. in diameter. High mass-transfer rates are obtained at total flow rates of at least 40 and 60 gpm, respectively. Flows of organic solvent and aqueous feeds are countercurrent between stages, but are in phase within a stage. The hydraulic capacity is in excess of 60 gpm with undiluted tri-n-butyl phosphate as the solvent, provided the aqueous phase contains at least 3M HNO(3). Individual titles are given in the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1189 Div. 20, 8

Argonne National Lab., Lemont, Ill.
NUCLEAR INSTRUMENT MODULES.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Nuclear reactors, Instrumentation),

(*Power supplies, Modules (Electronic)), (*Modules (Electronic), Power supplies), Design, Mechanical drawings.

Drawings (15) are presented for physically and electrically (with respect to power supply) interchangeable module systems. The two standard module heights are 5.25 and 8.75 in. The modules slide into bins mounted in E1A standard 19-in. racks. Individual titles are given in the Engineering Materials List (TID-4100). (AEC abstract)

Patent 3,154,376 Div. 20,4

EMULSION CONTROL IN LIQUID-SUSPENSION EXTRACTION.
AEC-assigned Patent,
by Bernice E. Paige and Bill J. Newby. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Reactor fuel processing, Solvent extraction), (*Colloids, Reactor fuel processing), Uranium, Plutonium, Fission products, Aluminum, Silicon, Proteins, Gelatins.

The method is for recovering uranium from solutions formed in the reprocessing of spent fuel elements from nuclear reactors. The dissolved values include aluminum and silicon. The method involves the use of a protein such as gelatin in one of the processing steps.

Patent 3,154,471 Div. 20

NUCLEAR REACTOR.
AEC-assigned Patent,
by Alvin Radkowsky. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear reactors), (*Nuclear reactors, Heaters), Nuclear power plants, Heat.

The nuclear reactor is designed to be used as a source of heat in a central station power plant. The structure includes a blanket of fertile material and a plurality of seed assemblies uniformly distributed within the blanket.

Patent 3,154,501 Div. 20, 7, 12

POLONIUM COMPOUND HEAT SOURCES.
AEC-assigned Patent,
by Martin R. Hertz. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radioactive batteries), (*Polonium compounds, Radioactive batteries), Heat, Electric power production, Power supplies, Satellites (Artificial), Rare earth elements, Containers, Temperature.

The radioactive heat source may be used in connection with direct conversion of heat to electric energy, for example, as batteries on power supplies in satellites. It is made by placing a quantity of polonium-210 and a quantity of at least one element selected from the group consisting of scandium, yttrium and the lanthanides in a container, closing the container, and thereafter heating the container and contents to a sufficiently high temperature as to react the contents to form a compound of polonium-210 with the element.

Patent 3,156,523 Div. 20, 4

ELEMENT 95 AND METHOD OF PRODUCING SAID ELEMENT.
AEC-assigned Patent,
by Glenn T. Seaborg. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Americium), (*Americium, Production), Transuranium elements, Radioactive isotopes, Radiochemistry, Chemical elements, Neutron reactions, Plutonium, Isotope separation.

Isotopes of element 95, americium, may be produced by bombarding plutonium produced in a neutronic reactor, which consists essentially of isotope 94(239) together with subatomic particles e.g., deuterons or neutrons. Element 95 is claimed as is an isotope having the mass number 242, and various salts of americium.

Patent 3,156,526 Div. 20, 4, 26

STAINLESS STEEL DECLADDING.
AEC-assigned Patent,
by Loranus P. Hatch, James J. Reilly, Charles B. Bartlett, and Richard Johnson. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel cladding), (*Stainless steel, Reactor fuel cladding), (*Reactor fuel cladding, Separation), Reactor fuel elements, Reactor materials, Chemical reactions, Oxygen, Aluminum compounds, Fluorides.

The process is for the separation of stainless steel cladding from the core of a nuclear fuel element. The cladding is removed by intimately contacting the clad bodies with a gaseous stream of a decladding mixture composed of gaseous oxygen containing solid particles having metal fluorides contained therein, that is, aluminum fluoride particles, at temperatures ranging from 675 degrees to about 750 degrees C.

Patent 3,156,532 Div. 20, 16

YTTRIUM-90 GENERATOR.
AEC-assigned Patent,
by Robert F. Doering and Walter D. Tucker.
10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Isotope separation), (*Yttrium, Sources), (*Isotope separation, Strontium), Radioactive decay, Ion exchange, Ion exchange resins, Beta particles, Medical equipment.

The yttrium-90 has application in medicine. Apparatus is disclosed for separating yttrium-90 from

its parent strontium-90. A vertical column with a beta shield is used. The column is divided into porous partitions forming three zones and has a porous bed and a porous support. Inlets and outlets are provided. A cation exchange resin is used.

Patent 3,156,623 Div. 20, 25

PLASMA SWITCHING PINCH TUBE.
AEC-assigned Patent,
by William R. Baker. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Plasma physics), (*Plasma medium, Discharge tubes), (*Magnetohydrodynamics, Discharge tubes), Magnetic pinch, Electronic switches, Generators, Heaters, Containment, Gas discharges.

A pinch tube configuration is used in which the portion of the plasma which is initially adjacent the insulator is separated from the remainder leaving the latter in an extremely pure condition for subsequent additional heating. The device operates in three stages, first stage in which gas in the device is ionized; a second stage where the plasma in the vicinity of insulators is removed; and a third stage where the remaining plasma is heated.

Patent 3,156,625 Div. 20

CORE FOR A SUPERCRITICAL PRESSURE POWER REACTOR.
AEC-assigned Patent,
by Harold Harty, James J. Regimbal, Kadzuhisa G. Toyoda, and Richard D. Widrig. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor cores), (*Reactor cores, Power reactors), (*Reactor fuel elements, Control rods), Pressurized water reactors, Nuclear reactors, Reactor system components, Design.

The nuclear reactor incorporates a plurality of internally cooled fuel elements suspended in a pool of water at atmospheric pressure. Cooling water is passed through pressure tubes in the fuel elements at supercritical pressure and temperature. The reactor is controlled by honeycomb-shaped control elements which enclose and interpenetrate a cluster of the fuel elements thereby serving to protect the reactor against rupture of a pressure tube.

Patent 3,156,747 Div. 20, 4, 26

METHOD OF MAKING FUEL COMPACTS FOR NEUTRONIC SYSTEMS.
AEC-assigned Patent,
by Joseph E. Burke. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Reactor fuel processing, Patents), (*Powder metals, Reactor fuels), Uranium, Plutonium, Hydrides, Pyrophoric materials, Aromatic compounds, Polyethylene plastics, Styrene plastics, Chemical bonds, Manufacturing methods.

The compact is made by intimately mixing a powdered metal such as uranium or plutonium with anhydrous benzene solution of a hydrocarbon plastic bonding material such as polyethylene or polystyrene. The resulting mixture is then dried and compacts are formed at pressure of from 2,500 to 100,000 pounds per square inch.

Patent 3,157,463 Div. 20, 4

EXTRACTION OF PLUTONIUM AND URANIUM VALUES FROM AQUEOUS SOLUTION.
AEC-assigned Patent,
by Leland L. Burger. 17 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Solvent extraction), (*Platinum, Solvent extraction), (*Uranium, Solvent extraction), Separation, Reactor fuels, Reactor fuel processing, Fission products, Organic solvents, Nitric acid, Neutron reactions, Fluid flow, Solutions, Powders.

The process is for separating plutonium and uranium from fission products present in an aqueous nitric acid dissolver solution. A solvent is used. The two phases obtained after extraction coalesce and separate rapidly so that an increased flow rate can be used.

Patent 3,158,543 Div. 20

FUEL ASSEMBLY SUPPORT SYSTEM FOR NUCLEAR REACTOR.
AEC-assigned Patent,
by Jerome Sherman, John E. Sharbaugh, William L. Fauth, Jr., Nunzio J. Palladino, and Philip G. De Huff. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear power plants), (*Nuclear reactor fuels, Supports), Reactor system components, Reactor cores, Control rods, Hafnium, Pressure vessels, Design, Pressurized water reactors.

The reactor is designed as a source of heat in a central station power plant. A seed and blanket type core is used. The reactivity of the core is controlled by hafnium cruciform control rods and fixed burnable poison located in the seed. The fuel assemblies are held down by control rod shrouds.

Patent 3,158,549 Div. 20

FUEL ASSEMBLY FOR NEUTRONIC REACTOR.
AEC-assigned Patent,
by Wayne D. Fowler. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel rods), (*Reactor fuel rods, Patents), Reactor fuel elements, Heat transfer, Design, Reactor cores, Nuclear reactors, Surfaces.

The fuel rod assembly introduces a minimum amount of non-heat transfer surface into contact with the active region of the core upon insertion of the assembly. Any fuel rod can be removed from the bundle or replaced independently of the other rods.

Patent 3,158,577 Div. 20

METHOD OF TREATING RADIOACTIVE WASTE.
AEC-assigned Patent,
by Lane A. Bray and Earl C. Martin. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radioactive waste), (*Radioactive waste, Disposal), Nitric acid, Ions, Nitrates, Solutions, Carbon, Reduction, Disaccharides, Reactor fuel elements, Reactor fuel processing.

The method relates to the reduction of the nitric acid, nitrous and nitrate ion content of radioactive waste solutions produced in the reprocessing of spent fuel elements from nuclear reactors. A disaccharide is added to the solution which is heated to between 85 degrees C. and the boiling point of the solution. The temperature is maintained until the residual carbon of the disaccharide is completely destroyed.

Patent 3,158,614 Div. 20, 4

PROCESS OF PRECIPITATING PLUTONIUM AND COMPOUNDS FORMED THEREBY.
AEC-assigned Patent,
by Glenn T. Seaborg, John E. Willard, and Stanley G. Thompson. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Plutonium), (*Plutonium, Chemical precipitation), (*Fission products, Separation), Reactor fuel processing, Purification, Complex compounds, Solvent extraction, Organic solvents, Quinolines, Alcohols.

Plutonium is separated from impurities by forming an aqueous solution of plutonium with the impurities, adding 8-hydroxy-quinoline to the solution and separating and recovering the plutonium 8-hydroxy-quinolate.

PB-166 575 Div. 20
OTS Prices: HC $1.00/MF $0.50

Naval Radiological Defense Lab., San Francisco, Calif.
AN ESTIMATE OF THE RELATIVE HAZARD OF BETA- AND GAMMA-RADIATION FROM FISSION PRODUCTS.
Final rept.,
by R. I. Condit, J. P. Dyson, and W. A. S. Lamb.
Apr 49, 19p
Proj. NE121507
USNRDL AD95H; AD 66 193
Unclassified report

Declassified 28 Apr 54.
Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Radiation hazards, Fission products), (*Gamma rays, Radiation hazards), (*Beta particles, Radiation hazards), Health physics, Hazards, Radiation effects, Dose rate, Shielding, Radiological contamination, Radiological dosage, Whole body irradiation, Radiation hazards, Radioactivity.

An estimate is made for the relative dosage of beta-radiation in rep and gamma-radiation in r associated with an aggregate of fission products. The dosage of both types of radiation is calculated as a function of height above a plane uniformly contaminated with fission products. The shielding afforded by clothing is discussed for beta-radiation. It is concluded that the dosage of beta-radiation associated with a dangerous dosage of gamma-radiation from a fission aggregate constitutes an independent peril which should be considered in instrumentation for the determination of radiological hazards. (Author)

21. Nuclear Propulsion

No Entries

22. Ordnance

Patent 3,154,780 Div. 22, 19

AUTOMATIC SHORAN BOMBING SYSTEM.
Air Force-assigned Patent,
by Donald W. Burbeck, Elwood E. Bolles, William E. Frady, Jr., William L. Exner, and James D. Hogan.
27 Oct 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Aircraft fire control systems), (*Fire control systems, Bombing), (*Bombing, Fire control systems), (*Shoran, Aircraft fire control systems), Navigational aids, Navigation computers.

The automatic bombing or navigation system is controlled by a digital computer which is programmed before takeoff and during flights receives other information. The system increases the number of aircraft serviced by a single group of beacons.

Patent 3,156,153 Div. 22

ROLLER BEARING MOUNTED BARREL FOR A MACHINE GUN.
Army-assigned Patent,
by John L. Lochhead. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gun components), (*Gun components, Roller bearings), (*Roller bearings, Gun components), Automatic weapons, Small arms, Gun barrels, Supports.

The roller bearing-type mounting is for use with machine guns having reciprocal barrels. The mounting reduces the bearing surfaces on which the barrel moves, and spaces the bearing surfaces from the barrel bore so as to be less effected by discharge heat than the bushing-type mountings.

Patent 3,156,208 Div. 22, 6

METHOD AND APPARATUS FOR SELF NOISE TESTS FOR SUBMERGED VEHICLES,
Navy-assigned Patent,
by Stephen Kowalyshyn. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Underwater sound equipment), (*Depth indicators, Underwater sound equipment), (*Underwater sound equipment, Depth indicators), Noise, Interference, Depth finding, Acoustic torpedoes, Torpedo components, Transducers.

The apparatus is for determining the relationship between the depth and self noise interferences for torpedoes carrying acoustic equipment. The torpedo carries an acoustic system for generating a steering signal and a transducer mounted on the nose of the torpedo, which forms the acoustic input of the system. The acoustic system is disclosed in patent No. 3,024,755. Average depth can be determined in one run.

Patent 3,158,060 Div. 22, 7

WAFER SWITCH HAVING QUICK RELEASE CONNECTOR.
Navy-assigned Patent,
by Robert H. Semenoff and William J. Donahue. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Release mechanisms), (*Release mechanisms, Aircraft equipment), (*Arming devices, Release mechanisms), (*Electric switches, Release mechanisms), Electric connectors, Bombs, Torpedoes, Airborne, Aircraft ammunition.

The electrical switch serves as a switch and as a quick release connector. It includes two spaced apart contacts. One contact is formed as a plug-in jack type and contains a spring biased member which is adapted to electrically engage the other contact when a non-conductive member is withdrawn from between the contacts. The switch connects an umbilical cord to a bomb which is to be dropped from an aircraft.

Patent 3,158,063 Div. 22

SEAR AND TRIGGER MECHANISM.
Navy-assigned Patent,
by David F. Anderson, Robert Butterworth, and Richard E. Taylor. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gun components), (*Gun components, Antiaircraft guns), (*Weapon systems, Shipborne), Rocket-assisted projectices, Firing mechanisms (Weapon), Design.

The sear and trigger mechanism is part of a weapon used on shipboard for antiaircraft use. The system includes a sear and trigger mechanism operated by round contact for locking and unlocking an operating slide in accordance with predetermined gun operating conditions, the operating slide actuating associated devices for controlling the entry and exit of rounds to and from the firing position, respectively.

Patent 3,158,098 Div. 22

LOW VOLTAGE DETONATOR SYSTEM.
AEC-assigned Patent,
by Robert J. Reithel. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric detonators), (*Electric detonators, Patents), (*Detonators, Patents), Explosives initiators, Design, Explosive materials.

The detonator contains secondary explosives only and requires initiating voltages low in comparison with those in the prior art. The detonator includes a hermetically tight capsule containing a dense explosive, such as PETN, and a bridge wire in contact with the explosive.

Patent 3,158,124 Div. 22

MISSILE LAUNCHING APPARATUS.
Navy-assigned Patent,
by Manuel Chevillon. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Torpedo launchers), (*Torpedo launchers, Surface-to-underwater), Underwater projectiles, Launching, Guidance, Electric wire, Reels.

The apparatus is for launching a submarine missile (such as a torpedo) from a surface vessel. The apparatus is designed to be carried on shipboard. The guidance system embodies a wire or conductor, one end of which is attached to the torpedo and the other end of which is located at the launching vessel's control station.

Patent 3,158,705 Div. 22

COMBINATION GRAZE AND IMPACT SWITCH.
Army-assigned Patent,
by Robert W. Bliss. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Firing mechanisms (Ammunition)), (*Firing mechanisms (Ammunition)), Electric switches), (*Electric switches, Firing mechanisms (Ammunition)), (*Impact fuzes, Electric switches), Firing circuits, Projectile fuzes, Rocket fuzes, Fuze functioning elements, Safety devices, Laminates.

The switch is for closing an electrical firing circuit in a rocket or projectile fuse when actuated by direct or graze impact of the projectile. A disc shaped conductor of spring-like material is supported between supports of dielectric material. A second conductor is spaced from the first conductor by the supports to form an air gap therebetween.

23. Personnel and Training

No Entries

24. Photography and Other Reproduction Processes

AD-401 863 Div. 24
OTS Prices: HC $3.00/none

American Zinc, Lead and Smelting Co., St. Louis, Mo.
PRELIMINARY STUDY INTO THE PRINCIPLES OF CONTINUOUS TONE ELECTROPHOTOGRAPHY.
Final technical rept. for 15 Jun-15 Dec 62,
by Otto C. Klein. 15 Dec 62, 73p
Contract DA44 009ENG5100

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electrophotography, Photographic tone), (*Photography, Electrostatics), Photographic equipment, Photographic materials, Zinc compounds, Oxides, Plastics, Binders, Particle size, Optical properties, Printing, Reproduction.

This report describes all of the equipment necessary for the successful production and evaluation of electrophotographic prints. The two basic ingredients of the electrophotographic coating, namely, zinc oxide and resinous binder, are examined and the effect of different types of binders are evaluated. Using a Pliolite binder, the effect of change in particle size of the zinc oxide is studied. Change in particle size of the zinc oxide is used as a variable to show that higher charge acceptance is possible in an unsensitized system when small particle size zinc oxide is used. Particle size is also examined from the standpoint of its effect on spectral response of the coating, and spectrograms are presented showing that zinc oxide absorbs strongly in the ultra-violet and that changing the particle size does not shift this absorption curve. The effect of various additives to the coating slurry are discussed and their usefulness in improving tonal range is evaluated. (Author)

25. Physics

AD-423 677 Div. 25, 12, 30
OTS Prices: HC $4.00/None

North American Aviation, Inc., Downey, Calif.
DIGITAL PROGRAMS FOR ESTABLISHING STEADY-STATE SPACE RADIATOR PERFORMANCE,
by D. B. Mackay and V. A. Hubler. Oct 63, 125p
Contract AF33 657 8953, Proj. 6146, Task 614609
ASD TDR63 222

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radiators, Spaceborne), (*Heat transfer, Mathematical analysis), (*Programming (Computers), Heat transfer), Performance (Engineering), Thermal radiation, Fluid mechanics, Convection, Spacecraft, Temperature control, Programming languages.

This document presents two IBM-7090 Fortran programs for the analysis of steady-state space radiator performance. One program calculated heat lost in space and radiator temperatures, with a given fluid inlet temperature. The other program computes radiator temperatures for a given heat loss. Both programs compute the fluid pressure drop and component weights. Common input data include radiator dimensions, material and fluid properties, fluid flow rate, and environmental configuration. The first program--found to have the more direct method of solution and requiring less computing time--is recommended for design purposes. The second program is recommended for calculation of off-design performance of a given space radiator. (Author)

26. Production and Management

AD-440 100 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
AGE-HARDENING,
by H. Bohm. 8 May 64, 22p
RSIC 174; TT 65 60116

Unclassified report

Trans. of Aluminum (West Germany) 1963, v. 39, no. 12, p. 753-759.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Alloys, Hardening), (*Hardening, Aging (Materials)), Solid solutions, Decomposition, Theory, Elasticity, Hardness, Tensile properties, Aluminum alloys, Copper alloys, Magnesium alloys, Silicon alloys, Zinc alloys.

A review is presented of the domain of age hardening. After a description of the various decomposition states which may occur on the decomposition of supersaturated solid solutions, the most important age-hardening theories are discussed. Depending on the behavior of the particles forming upon decomposition, these theories fall into one of two groups. Thereupon the question as to which age-hardening theory is best capable of describing the age-hardening in various decomposition stages is examined. In conclusion, after a comparison of the change in elastic limit and in hardness occurring upon age hardening, some possibilities of the further increase of strength on age hardening are touched upon.

Patent 3,153,825 Div. 26, 17

CARBON-BONDED REFRACTORY CASTING MOLD AND PROCESS FOR FABRICATION THEREOF.
Army-assigned Patent,
by Bryant W. Crocker. 27 Oct 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Molding), (*Molding, Industrial equipment), Bonding, Carbon, Zirconium compounds, Silicates, Thermosetting plastics, Molding materials, Titanium, Uranium.

The process is for treating shell molds formed of a mixture of zircon and a thermosetting resin polymerized into a temporary binder for the sand. The resin is carbonized at about 1650 degrees F. within a vacuum of about 20 microns. The combustion gases are completely exhausted during this step. Thereafter the heated mold is cooled to 400 degrees F. prior to removal from the vacuum.

Patent 3,153,850 Div. 26

METHOD AND DEVICE FOR CONTROLLING ULTRASONIC WELDING APPARATUS.
AEC-assigned Patent,
by Daniel C. Worlton and Ray A. Walker. 27 Oct 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents: Welding), (*Welding, Ultrasonic radiation), (*Ultrasonic radiation, Welding), Welds.

Awelding head is excited with ultrasonic vibrations and the welding tip is applied with force to a workpiece. The quality of the ultrasonic weld is controlled by insuring that the proper weld time is utilized in the welding operation.

Patent 3,156,011 Div. 26

SELF-CONTAINED VARIABLE-ENVIRONMENT PRESSING DIE,
AEC-assigned Patent,
by Donald M. Olson. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Dies), (*Dies, Presses (Machinery)), Controlled atmospheres, Heating, Vacuum apparatus, Power equipment, Portable, Powder metallurgy, Pressure.

A portable die assembly is provided in which the auxiliary heating, vacuum pumping, and power equipment are portable. The power supply required is 110 volt house current. The unit can be used in any press having a 12-inch clearance between the platens. A commercial hydraulic truck jack can be used for the press. The assembly may be used as an experimental tool in powder metallurgy programs.

Patent 3,156,039 Div. 26

HIGH ENERGY FORMING PROCESS.
Army-assigned Patent,
by Charles H. Martens. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Explosive forming), (*Explosive forming, Stainless steel), Sheets, Fluids, Detonations, Liquids, Nitrogen, Dies.

A work piece of AISI 301 stainless steel sheet is formed by the use of high pressures. The pressures are instantaneously created in a fluid by detonation of an explosive charge in the fluid. The pressure is transmitted to the surface of a work piece forcing it to conform to the configuration of a die. Liquid nitrogen is used for the fluid.

Patent 3,156,534 Div. 26, 20

APPARATUS FOR TREATMENT OF MOLTEN MATERIALS.
AEC-assigned Patent,
by Paul R. Josephson and Lawrence E. Burkhart.
10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Liquid metals), (*Liquid metals, Separation), Salts, Solutions, Centrifuges, Reduction (Chemistry), Plutonium, Uranium alloys, Aluminum alloys, Potassium compounds, Chlorides, Aluminum compounds, Aluminum, Fission products, Uranium compounds, Uranium, Stainless steel, Melting.

The apparatus is for the reaction of molten metals with molten salts such as disclosed in patent No. 2,943,586. The apparatus is a combination of a vertical column, an inlet and an futlet in the top of the column, a rotatable shaft axially arranged in the column, a plurality of hollow distributor elements attached to the shaft, each of the elements being formed of two truncated cones joined at their widest bases, a plurality of orifices in the periphery of the joined bases, and a plurality of guide funnels attached to the inside of the column wall, one each below each distributor element.

Patent 3,157,054 Div. 26

ROTARY FRICTION SHAFT COUPLING.
Army-assigned Patent,
by Vincent C. Dean. 17 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Shaft couplings), (*Shaft couplings, Patents), (*Rotary seals, Shaft couplings), Diaphragms (Mechanics), Drives, Membranes, Friction.

The mechanism transmits motion through the wall of an enclosure. It consists of a housing, a driving plate, two sets of balls, a membrane and a driven plate. These elements are arranged to transmit motion through the wall while maintaining a hermetic seal.

Patent 3,158,030 Div. 26

MECHANICAL COAL SAMPLER.
TVA-assigned Patent,
by Gordon B. Cross. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Samplers), (*Samplers, Coal), (*Quality control, Coal), Railroad cars, Test equipment.

The mechanical device is for sampling coal on a railroad car from the top to the bottom. A rectangular-shaped sampling tube has a rigid cutting edge at its bottom and closing gates just above the cutting edge. A core sampling is made with the device.

Patent 3,158,244 Div. 26, 11

REVERSIBLE DOUBLE-DRIVE CLUTCH.
Agriculture-assigned Patent,
by James P. Lanigan, Jr., Eugene F. Wallace, James I. Kotter, and Harold L. Salaun, Jr. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Clutches), (*Clutches, Design), Torque, Drives, Transmission gears, Drive sprockets.

The apparatus permits one reversible source of driving torque to drive in sequence two independent systems. The reversible double-drive clutch includes clutch elements equipped with positive, non-slip, jaw-type teeth capable of transmitting high torque from the driving source to the driven systems at low speeds and with no loss in mechanical efficiency.

Patent 3,158,334 Div. 26

ROLLING MACHINE FOR FORMING CENTERLESS ROLLED BLANKETS.
Air Force-assigned Patent,
by Burns A. Cash. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Packaging), (*Packaging, Winding), (*Textiles, Winding), Sheets, Machines, Fibers.

The machine is for rolling and packaging blankets of loose fibrous material such as yarn or chaff or organic, metallic or ceramic composition. The blanket material is rolled without the use of a spool or hub in such a manner that successive windings are uniformly compacted.

27. Propulsion Systems

Patent 3,156,090 Div. 27, 12

ION ROCKET,
NASA-assigned Patent,
by Harold R. Kaufman. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Ion engines), (*Ion engines, Specifications), (*Electric propulsion, Ion engine), (*Space propulsion, Ion engines), Electric engines, Spacecraft, Electron bombardment, Ions, Rocket motors, Specific impulse.

The ion rocket engine is used for space vehicles. The electric ion rocket engine utilizes electron bombardment to produce ions. It can use a variety of propellants which have desirable storage and handling characteristics.

28. Psychology and Human Engineering

Patent 3,158,149 Div. 28

ACCELERATION PROTECTIVE APPARATUS.
Navy-assigned Patent,
by Reuben F. Gray. 24 Nov 64 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Protective clothing), (*Protective clothing, Acceleration), (*Acceleration, Protective clothing), Pressure suits, Accelerometers, Pneumatic valves, Pneumatic systems, Pilots, Flight clothing.

The apparatus is for use by an aviator subjected to accelerative forces of indefinite duration. The protective suit includes an acceleration responsive metering valve which discretely controls the quantity of pressurized air supplied to the jacket section of the suit so that respiration can be accomplished without personal discomfort to the pilot.

PB-166 537 Div. 28
OTS Prices: HC $1.00/MF $0.50

Maryland Univ., College Park.
THE MECHANICS OF CONCEPT-WORK: EXPOSURE TIME AND NUMBER OF DIMENSIONS.
Technical rept.,
by Murray Glanzer and Janellen Huttenlocher.
Oct 60, 17p
Contract DA49 007MD1004
AD 246 556
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Learning, Performance tests), (*Psychometrics, Learning), Reaction (Psychology), Performance (Human), Reasoning, Feedback, Probability, Test methods, Analysis of variances.

Concept-work refers to the process by which the subject eliminates incorrect solutions and specifies correct solutions to a concept problem. Mechanics refers to the details of this process. Two experiments were carried out to determine the effect of three variables on the process of concept acquisition, or concept-work. In Experiment I, the main experimental variables were number of dimensions and exposure time of examples. Number of dimensions had a highly significant effect. The effect of exposure time was orderly and clear, but not as marked. In Experiment II, the variables were exposure time and reduction rate, the rate at which irrelevant dimensions or hypotheses are eliminated by the example series. The results support only the effect of exposure time. Various possible models for the data are considered and the relevance of the work to the building of a problem-solving, as opposed to a learning, model for concept formation is considered. (Author)

29. Quartermaster Equipment and Supplies

Patent 3,156,979 Div. 29, 12

CONTAINER OPENER.
Air Force-assigned Patent,
by Warren R. Hafstrom, George Boswinkle, and Lester H. Hinkel. 17 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Kitchen equipment), (*Kitchen equipment, Space tools), (*Space tools, Kitchen equipment), Supplies, Food dispensing, Spaceborne.

The can opener is for use on aerospace vehicles where, because of zero gravity, conventional openers are not satisfactory. The opener severs one end of a cylindrical container and installs a flexible mouthpiece or cover over the severed end of the container.

Patent Design 199,592 Div. 29

INSULATED JUG.
Army-assigned Patent,
by Joseph Tolciss. 17 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Tanks (Containers)), (*Tanks (Containers), Thermal insulation), Design.

The cylindrical container has a flat bottom and a rounded, convex top. The outlet is in the form of a neck projecting from the top of the container. The outlet is protected by a tubular handle.

PB-166 576 Div. 29, 20
OTS Prices: HC $1.00/MF $0.50

Kansas State Univ., Manhattan.
DETERMINATION OF THE FEASIBILITY OF PRODUCING NON-STALING BREAD-LIKE PRODUCTS.
Progress rept. no. 6, 15 Mar-15 May 59,
by John A. Johnson and Donald Miller. 15 May 59, 10p
Contract DA19 129qm1119, Proj. 7 84 06 032
AD 232 782
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Bread, Production), Acceptability, Storage, Fatty acids, Starches, Enzymes, Viscosity, Radiation effects, Gamma rays.

Bread was prepared using normal wheat flour. Fatty acids were introduced into the bread by melting and blending the acid with the vegetable shortening used in the formula. Increments of myristic, palmitic and oleic acids up to and including 1% based on flour weight retarded crumb firming. The fatty acid effect was comparable to that of 'Merj 45'. Super-imposing of bacterial alpha-amylase caused the bread to be even softer. Storage tests were conducted for 96 hours. An explanation of the role of fatty acids and enzymes as related to crumb firming is offered. Fatty acids did not have a marked effect on the hot paste viscosity but did effect the viscosity of the paste during the cooling cycle. The effect of the fatty acids on the viscosity of the cooling paste was increasingly noticeable as the concentration of fatty acid increased up to 1%. Treatment of native wheat starch with gamma radiation did not improve the baking quality of the bread nor cause the fatty acid to be more effective as a retarder of bread crumb firming. Irradiated starch was more subject to enzyme attack during the fermentation than native starch. Starch which has been modified in any way to destroy the granule structure appears to cause detrimental effects during baking. (Author)

30. Research and Research Equipment

AD-402 938 Div. 30, 26
OTS Prices: HC $1.00/MF $None

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SPECIMEN PREPARATION BY SPARK-EROSION CUTTING,
by H. H. Ehlers and D. F. Kolesar. 14 Mar 63,
10p LL-TR-303
Contract AF19 628 500
Unclassified report

Descriptors: (*Spark machining, Single crystals), Metals, Surface properties, Strain (Mechanics), Test methods, Laboratory equipment.

An apparatus for the strain-free cutting of conducting materials has been designed, constructed, and tested. The optimum condition for cutting various materials has been determined and these materials are listed, along with x-ray photographs of various cut surfaces which indicate the degree of surface perfection.

AD-429 915 Div. 30, 15, 18, 26, 32
OTS Prices: HC $4.00/MF $None

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING: A BIBLIOGRAPHY OF THEORY AND APPLICATION,
by Richard Bellman and Rebecca Karush.
Feb 64, 145p RM-3951-PR
Contract AF49 638 700
N64 22614
Unclassified report

Descriptors: (*Dynamic programming, Bibliographies), (*Bibliographies, Dynamic programming), Theory, Decision theory, Reports, Indexes, Documentation, Subject indexing, Mathematical programming, Operations research, Calculus of variations, Communication theory, Game theory, Optimization, Sequential analysis, Search theory, Scheduling, Stochastic processes, Reliability, Logistics, Inventory control, Management planning, Economics, Control, Trajectories, Physics, Transportation.

Dynamic programming may be described as a mathematical theory of multistage decision processes. The method presented by this theory provides a valuable tool for the investigation of many challenging problems in such diverse fields as economics, engineering, systems analysis, and biomedical research. A bibliography of publications devoted to the theory and application of dynamic programming should prove helpful in all phases of problem solving: recognition, formulation, analysis, computation, and reformulation, for these different scientific areas. The bibliography is divided into three different parts: first, there is a chronological ordering of publications, with authors listed alphabetically under each year; second, an alphabetical index of authors; third, a subject index, with authors listed alphabetically under each subject category.

AD-441 397 Div. 30, 25
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
PHOTOELASTICITY: PURELY OPTICAL METHOD FOR

DETERMINING DEFORMATIONS IN THICKNESS OF MODELS WITH PRACTICALLY NO RESTRICTIONS ON PARALLELISM OF SURFACES,
by V. Tesar. 28 May 64, 12p
RSIC 186; TT 65 60117

Unclassified report

Trans. of Revue d'Optique Theorique et Instrumentale (France) 1932, v. 11, no. 3, p. 97-104. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Photoelasticity, Model tests), (*Optical phenomena, Photoelasticity), Models (Simulations), Deformation, Measurement, Optical equipment.

A discussion is given of a purely optical method for determination of the sum of principal stresses at all points in models used in photoelasticity studies. The method requires only medium smoothness of the surfaces and makes no requirements on parallelism of the surfaces. A description is given of an experimental realization of the method. (Author)

CAPE-918 Div. 30, 17

Oak Ridge National Lab., Tenn.
CORROSION LOOP TEST RIG.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Corrosion, Test equipment), (*Test equipment, Mechanical drawings), Thermocouples, Heaters, Temperature control, Power supplies, Electric relays, Recording systems.

Six drawings of components of a corrosion loop are included. The thermocouple patch (an aluminum panel) accommodates 24 incoming thermocouples. The heater power supply has an input of 115 v, 60 ohm, and 5 amp with an output of 0 to 135 v and 5 amp. The temperature control unit uses mercury relays and a Brown recorder. Individual titles are given in the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1122 Div. 30, 4

Oak Ridge Inst. of Nuclear Studies, Inc., Tenn.
THIN-LAYER CHROMATOGRAPHY SCRAPER.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Chromatographic analysis, Collecting methods), Absorption (Physical), Mechanical drawings, Films, Laboratory equipment.

Drawings (2) are presented of a scraping device for rapid and quantitative transfer of extremely small zones of adsorbent from narrow glass plates into counting vials. Fifty samples (2-mm zones) can be collected in about 5 min. Individual titles are given in the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1128 Div. 30

Hanford Atomic Products Operation, Richland, Wash.
HIGH-TEST PRESSURIZED FILAMENT AND MELTING POINT FURNACES.
Engineering Materials. Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Laboratory furnaces, Mechanical drawings), Transition temperature, Melting, Ceramic materials, Uranium compounds, Plutonium compounds, Oxides, Pressure, Filaments, Furnaces.

Drawings (3) of the furnaces, which are used to determine melting points for solid ceramic materials such as UO2-PuO2, are presented. The pressurized furnace is designed for a working pressure of 1500 psi and a working temperature of 500F. Individual titles are given in the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-1135 Div. 30, 7

Sandia Corp., Albuquerque, N. Mex.
GALVANOMETER PEDESTAL, LARGE.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Galvanometers, Mounting brackets), Vibration, Steel, Metal plates, Mechanical drawings.

Drawings (14) are presented for a pedestal which isolates light-beam galvanometers from vibrations to a degree that permits use of sensitive galvanometers at distances of 4m from their scales. Two flat steel plates are suspended by diagonal tension springs between a steel frame and the corners of the lower-plate. Four oil-filled dash-pots positioned between the floor of the frame and the lower plate dampen any motion imparted to the mass. Individual titles are given in the Engineering Materials List (TID-4100). (AEC abstract)

Patent 3,156,622 Div. 30, 25

APPARATUS FOR HEATING IONS IN A PLASMA.
AEC-assigned Patent,
by Milton M. Hill and Donald F. Martin.
10 Nov 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Heaters), (*Plasma physics, Heating), (*Heating, Ions), Magnetic fields.

A method and apparatus is provided whereby a plasma is created at a low energy, introduced to the central region of an axially symmetric magnetic field, and at the same time heated non-adiabatically, and then adiabatically heated from its nonadiabatically preheated state in the manner set out above, to an ultimate energy significantly higher than that attained without pre-heating.

Patent 3,156,869 Div. 30

ELECTROMETER HAVING FLEXIBLE ELECTRODES AND FLEXIBLE FIBER.
AEC-assigned Patent,
by Francis R. Shonka. 10 Nov 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electrometers), (*Electrometers, Patents), Electrodes, Flexible structures.

The electrometer has flexible deflecting electrodes with a sag equal to or greater than that of the movable fiber. The flexible electrodes and movable fiber are wound on a frame parallel to each other. The frame is placed over a plastic bridge mount so that the electrodes and the fiber are in pressure contact with the mount and a blast of hot air is directed on the surface of the mount in contact with the electrodes and fiber. The surface of the mount is caused to melt, thereby allowing the electrodes and the fiber to sink and be embedded there in a single operation.

Patent 3,158,172 Div. 30, 13

HIGH-TEMPERATURE, HIGH-PRESSURE SPHERICAL SEGMENT VALVE.
NASA-assigned Patent,
by Angelo Giovannetti, Jr., Russel M. Himmelright, Kenneth A. Meyer, and Hakuzo Nitta.24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, High-pressure valves), (*High-pressure valves, Wind tunnels), High-temperature research, Pneumatic valves, Guided missiles models, Tests.

The valve is used to start and stop the flow of high-temperature, high-pressure gas in a conduit connecting a gas heating unit and a wind tunnel, the gas to be used in wind tunnel tests on missile models. The valve mechanism has a housing for insertion in axial alignment between conduit sections. The system includes an arrangement of cooling ducts to cool surfaces subjected to high temperatures.

Patent 3,158,753 Div. 30, 8

DIGITAL SHIFT REGISTER USING OUTPUT TRANSFORMER OVERSHOOT PULSE AS SEQUENCING TRIGGER PULSE.
Navy-assigned Patent,
by Cyrus J. Creveling. 24 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Digital computers), (*Digital computers, Circuits), (*Gates (Circuits), Digital computers), Wiring diagrams, Electronic equipment, Computer logic.

Digital shift registers are disclosed which include gated amplifiers. An analog delay line is not required. The circuit includes a plurality of gated amplifiers connected in cascade, a clock pulse source, a regenerative amplifier or transistor, a transformer and other components.

PB-166 527 Div. 30
OTS Prices: HC $1.00/MF $0.50

Scientific American, Inc., New York.
COMPUTER v. CHESS-PLAYER,
by Alex Bernstein and Michael de V:Roberts.
1958, 6p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Programming (Computers), Game theory), (*Game theory, Programming (Computers)), (*Computers, Game theory), Digital computers, Computer logic, Decision theory.

A chess-playing program was designed for the IBM 704 digital computer. This program does not allow the computer to learn from experience. The machine is about as limited as a human chess player of better than novice ability. A typical game played by the machine against a skillful opponent is examined. The computer can be beaten by a three-move trap. The chief weakness in its game lies in a bias toward moving attacked pieces rather than defending them. The only way to correct this failing is to extend the eight minute time limit imposed on the machine.

PB-166 529 Div. 30
OTS Prices: HC $1.00/MF $0.50

Standard Elektrik Lorenz, A. G. (West Germany).
THE AUTOMATIC RECOGNITION OF TYPEWRITTEN NUMBERS,
by Walter Dietrich. Sep 59, 1p
Unclassified report

Pub. in Proc. of the Institution of Electrical Engineers, v. 106, Part B. no. 26, Sep 59.
Legibility of this document is in part unsatisfactory.

Descriptors: (*Pattern recognition, Numbers), (*Numbers, Pattern recognition), (*Reading machines, Optical equipment), Fouling, Positioning devices (Machinery), Scanning, Typewriters, Automation.

An optical procedure is described whereby the shapes of numbers and letters are supplied electrically for identification, with special emphasis on the centering of the characters and on identification of fouled characters. The characters are moved in a direction perpendicular to the scanning sweep, so that the character is gradually dissolved in an area. Under the condition that the character becomes stored in the shift register synchronously with the scanning process, the registered information will correspond to the quantized but natural shape of the character. When the registering process is stopped, the register stages will retain their information, which then can be made visible with the aid of small lamps connected to the stages. The centering circuit must center the information in a defined area of the shift register, say, in the top left-hand corner. To do so, the whole information is shifted by pulses, first to the left and then to the top until some stages of column 1 and line 1 report 'black'. For this shifting procedure the stages of the register are connected in a 2-dimensional manner. For the reading of smudged numerals it will be more suitable, not only to use the first column and the first line as centering criteria, but to supervise electrically the whole area where the centered character shall be located, e.g. 6 columns and 10 lines. Any information will be signalled as centered only if it is of the approximate size of a numeral.

PB-166 531 Div. 30, 32
OTS Prices: HC $3.00/MF $0.75

Systems Development Corp., Santa Monica, Calif.
THE SIMULATION OF COGNITIVE PROCESSES: AN ANNOTATED BIBLIOGRAPHY,
by Paul L. Simmons and Robert F. Simmons.
25 Apr 60, 82p TM-486
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Bionics, Bibliographies), (*Bibliographies,

Bionics), Artificial intelligence, Cybernetics, Pattern recognition, Learning, Theory, Mathematical models, Automata, Probability, Nervous system, Physiology, Game theory, Programming (Computers), Programming languages, Information retrieval.

Contents: (1) Theoretical formulations and discussions (discussion of thinking or learning by machines; operational definitions or suggestions for consciousness, values, thinking, learning, etc.); (2) Mathematical models, automata and probabilistics; (3) Formal nerve nets; (4) Neurophysiology (particularly as applied to the development of machines); (5) Simulated neurons and organisms; (6) Pattern recognition (particularly of written characters and speech); (7) Games, problem solving, and heuristics (chess, checkers, geometry, symbolic logic, etc.); (8) Learning systems (programs or machines which modify their behavior as a function of experience); (9) Language processing (mechanical translation and information retrieval reviews and studies of language); (10) Miscellaneous (general cybernetics and secondary derivative articles).

PB-166 535 Div. 30
OTS Prices: HC $1.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
A SELF ORGANIZING RECOGNITION SYSTEM,
by J. R. Singer. 9 May 61, 15p
Unclassified report

Preprint of Western Joint Computer Conference Paper, 9-11 May 61, Los Angeles.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pattern recognition, Servomechanisms), (*Artificial intelligence, Servomechanisms), Bionics, Input-output devices, Learning, Feedback, Adaptive control systems, Systems engineering.

The design of a system for recognition of patterns or objects with provision for size and rotation invariance is described. This system is also self-learning in that a program of remembering a pattern by 'seeing' that pattern is incorporated in the system. The process of 'free learning' which is defined here as abstracting from the results of numerous inputs and outputs to arrive at a more general recognition class is also part of the design. The properties incorporated in the design are, briefly described and then the system is outlined.

PB-166 548 Div. 30
OTS Prices: HC $1.00/MF $0.50

National Cash Register Co., Hawthorne, Calif.
WIDE-TOLERANCE OPTICAL CHARACTER RECOGNITION FOR EXISTING PRINTING MECHANISMS,
by R. K. Gerlach. 1962, 22p
Unclassified report

Descriptors: (*Character recognition, Optical equipment), (*Reading machines, Character recognition), Optical scanning, Input-output devices, Printing, Compatability, Specifications, Systems engineering.

A research and development program was initiated several years ago to create a wide-tolerance optical character recognition system which would be compatible with existing printing mechanisms. The optical reading system was conceived with the following fundamental objectives. (1) Read journal tapes from existing printers with no mechanism modifications except font change (2) Operate with minimum reject rate (3) Operate with minimum error rate (4) Edit and rearrange information read (5) Achieve reader-printer compatibility, editing features, and minimum reject and error characteristics at the lowest possible cost.

PB-166 557 Div. 30
OTS Prices: HC $5.00/MF $1.00

Bunker-Ramo Corp., Canoga Park, Calif.
WORD COMBINATIONS.
Progress rept. no. 7,
by Gerhard Reitz, Loretta Ertel, Donna Firth, Marguerite Mazur, and Steven Smith. 7 Oct 64, 165p B-199
Grant NSF C233
Unclassified report

Rept. on Computer-Aided Research in Machine Translation.

Descriptors: (*Word association, Machine translation), (*Machine translation, Word association), USSR, Computer storage devices, Magnetic cores, Language, Automatic, Programming (Computers), Punched cards.

Contents:
Description of word combinations format
On cards
In IBM-7094 core memory
Description of changes
Data changes
Program changes
Test sentences used as input
Output of text sentences
Plans for future additions to the word combination program.

PB-166 558 Div. 30
OTS Prices: HC $1.00/MF $0.50

Hughes Aircraft Co., Culver City, Calif.
A HIERARCHIC APPROACH TO AUTOMATED INFORMATION RETRIEVAL,
by H. Thayne Johnson. 29 Mar 62, 15p
HAC-SRS-491
Unclassified report

Rept. on Special Research Study.

Descriptors: (*Information retrieval, Classification), (*Classification, Information retrieval), Subject indexing, Analysis, Reports, Automation, Display systems.

Current manual systems for retrieval of information are regarded incapable of satisfactory, specialized service. The problem of such retrieval is claimed to depend upon concepts rather than words, even though words remain the vehicle for retrieval. Three conceptual processes occur in preparation of a document: (1) the writer expresses concepts by using his own words in his own style; (2) the indexer analyzes and indexes, using his own concepts and those inherent in an indexing system, the latter, expressed in words, adapting the document both for its own retrieval and its information; and (3) the user searches for the document, or its information, by a question expressing his own concepts and phrased in his own terms. The retrieval problem is resolved by making words into phrases representing concepts and displaying the terms so that writer, indexer, and retriever are brought close together conceptually. A man-machine system for retrieval is proposed that will extend the user's effective intellect by performing intelligence functions now performed by him and by enabling him to perform intelligence functions not now possible. The man-machine interrelationships include

the following. In addition of a publication to a system, it is analyzed by humans. Descriptive terms are assigned and a bibliographic entry is stored at proper levels in the hierarchy which constitutes an addition to the symbolic store, the equivalent of the card catalog.

PB-166 562 Div. 30, 32
OTS Prices: HC $2.00/MF $0.50

Burroughs Corp., Paoli, Pa.
SOME RELATIONS BETWEEN CHARACTER RECOGNITION AND LINGUISTIC PROCESSES,
by David M. Stern. 16 May 63, 32p Burr TR-63-21
Proj. 3908
Unclassified report

Descriptors: (*Character recognition, Languages), (*Languages, Character recognition), Computer logic, Input-output devices, Pattern recognition, Correlation techniques.

A character recognizer is shown to be related to Chomsky grammars by constructing an inverse grammar which performs the same function as does the character recognizer. The inverse grammar is seen to be related to Chomsky grammars through the formalization of Speierman. (Author)

PB-166 563 Div. 30, 18
OTS Prices: HC $1.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
THE MARRIAGE OF ON-LINE HUMAN DECISION WITH COMPUTER PROGRAMS,
by Herbert M. Teager. Dec 60, 6p
NAVEXOS P1278
Unclassified report

Pub. in Naval Research Logistics Quarterly, 1960, v. 7, no. 4, p. 379-383.

Descriptors: (*Decision making, Programming (Computers)), (*Programming (Computers), Decision making), Programming languages, Real time, Input-output devices, Display systems, Logistics.

As the logistics problems of current interest become more and more complex, it becomes apparent that heuristic methods hold more promise than exhaustive or algorithmic methods of solution. It is also becoming clearer that heuristics, per se, are useless in approaching large combinatorial problems (via pattern recognition, for example), unless some general techniques are developed to draw out the specific 'best' heuristics required for each problem. It is a fact that humans are, at present, far more efficient in developing and applying such heuristics than a machine. It is therefore of considerable value to explore how the best features of both human and machine decision can be married. The general problem requires the development of common meaningful languages, specialized input-output display and entry facilities, and a means of time-sharing the computer, in order to efficiently match the machine-vs the human-decision time. (Author)

31. Ships and Marine Equipment

PB-166 580 Div. 31
OTS Prices: HC $3.00/MF $0.75

Institute of Engineering Research, Univ. of California, Berkeley.
EFFECT ON INITIAL DEFLECTIONS ON SHIP PLATING PERFORMANCE UNDER COMPRESSION-THEORY AND EXPERIMENT,
by H.-G. Schultz. Nov 64, 54p NA-64-10
Contract MA2620, Task 4
Unclassified report

Descriptors: (*Ship plates, Compressive properties), (*Marine engineering, Ship plates), Flat plates, Ship structural components, Deformation, Deflection, Loading (Mechanics), Models (Simulations), Theory, Mathematical analysis.

The stress behavior of flat wide plates having initial deformations loaded by edge compression beyond the buckling limit is studied both theoretically and experimentally. The theoretical part deals with actual ship plating of any aspect ratio under edge compression having various amounts of initial deflections, whereas the second part is concerned with the experimental investigation of a transversely framed box girder model with relatively heavy, wide bottom plating, and which is subjected to bending moments by means of bottom pressure.

PB-166 581 Div. 31
OTS Prices: HC $1.00/MF $0.50

Institute of Engineering Research, Univ. of California, Berkeley.
SHIP STRUCTURE SURVEY AND PROGRAM (NO. 2)
by R. Glasfeld. Sep 64, 23p NA-64-9
Contract MA2620, Task 4
Unclassified report

See also PB 163 291.

Descriptors: (*Ship structural components, Marine engineering), (*Marine engineering, Ship structural components), Design, Ship plates, Ship hulls, Impact shock, Loading (Mechanics), Beams (Structural), Costs, Maintenance, Reviews, Deformation.

Contents:
Hull structure simplification
Ship envelope plating
Slamming
Proposed research program.

32. Miscellaneous Arts and Sciences

AD-277 214 Div. 32
OTS Prices: HC $3.00/None

RAND, Corp., Santa Monica, Calif.
ALTERNATIVE APPROACHES TO THE INTERNATIONAL ORGANIZATION OF DISARMAMENT,
Final rept.,
by Fred C. Ikle. Feb 62, 53p R-391-ARPA
Contract SD79, ARPA Order 189 61
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Foreign policy, Disarmament), (*Disarmament, Political science), (*Arms control, Foreign policy), United States Government, Government (Foreign), Attitudes, Public opinion, Leadership,

Decision making, Nuclear warfare, Control systems, Deterrence, Cold war.

Various short-term and long-term objectives tend to become intermingled in the formulation of a disarmament policy, particularly in formal proposals for organizational arrangements. There are two principles for organizing the verification of compliance with disarmament agreements: impartial verification by an international organization, and adversary or reciprocal verification by the parties or 'sides' to an agreement. The most desirable mixture of the two principles depends on the expected response to a violation, on the techniques and place of verification, and on other political and military factors. For disarmament measures that leave the major powers in control of large forces, adversary verification tends to be more appropriate. Serious political and ideological problems arise if a universal international organization is to be set up to enforce rather than merely verify disarmament agreements. These problems may be manageable as long as the international organization is expected to impose only limited sanctions for minor violations, or to control only a limited force for maintaining the peace outside of major power conflicts. (Author)

Patent 3,156,079 Div. 32

CORN HEADER ATTACHMENT,
Agriculture-assigned Patent,
by Joseph K. Park and Byron K. Webb. 10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Agriculture), (*Agriculture, Machines), (*Cereals, Machines).

The corn header attachment is for use with a grain combine. It can be mounted directly on the standard grain header itself without the necessity of first removing the latter. The attachment includes elements for gathering the corn stalks into the header and for guiding them into position over the cutterbar of the grain combine.

Patent 3,156,568 Div. 32, 26

PROCESS OF MAKING LOW-FAT RIPENED SKIM MILK CHEESE.
Agriculture-assigned Patent,
by Robert E. Hargrove and Frank E. McDonough.
10 Nov 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Food), (*Food, Processing), Milk, Milk fat.

The cheese product is low in fat content and resembles cheddar cheese in texture and flavor. The product contains about 40 percent milk solids not fat, about 52 to 58 percent moisture and about 1.3 to 1.8 percent salt. A provolone type and a blue cheese type product can be obtained with modifications of the process.

PB-166 525 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
A CONCEPTUAL FRAMEWORK FOR LANGUAGE DATA PROCESSING IN SYNTHEX,
by R. F. Simmons. 28 Nov 60, 16p TM-560
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Language, Data processing systems), (*Data processing systems, Computers), Input-output devices, Machine translation, Computer storage devices, Synthesis, Documentation, Subject indexing.

The paper attempts to present an analysis of problems in language data processing in the conceptual framework furnished by the design requirements of Proto-Synthex. Proto-Synthex is required to accept ordinary text as printed input, operate on such input for purposes of information extraction, reduction, and storage, and output printed language in response to printed questions or commands.

PB-166 526 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
AUTOMATIC ANALYSIS OF THE CONTENTS OF DOCUMENTS. PART I: HISTORICAL REVIEW,
by R. E. Wyllys. 7 Dec 61, 16p FN-6089
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Machine translation, Reviews), (*Information retrieval, Reviews), (*Abstracting, Automatic), (*Documentation, Automatic), Subject indexing, Languages, Analysis, Computers.

The growth in the use of computers in handling natural-language data is discussed, beginning with machine translation of languages and going on to the analysis by computers of the contents of documents. Automatic production of condensed representations of the contents of documents is shown to be an essential step toward the solution of the problems of handling the increasing volume of scientific and technical literature. Within the field of automatic document-content analysis, the areas first explored have been automatic abstracting and indexing; published studies in these areas are reviewed and compared. (Author)

PB-166 528 Div. 32
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
A STUDY OF THE STATISTICS OF LETTERS IN ENGLISH WORDS,
by Charles P. Bourne and Donald F. Ford. 1 Dec 60, 21p
Unclassified report

Pub. in Information and Control, v. 4, no. 1, Mar 61, p. 48-67.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Language, Statistical analysis), Vocabulary, Distribution, Coding.

Data which had previously been published by several authors (Ohlman, 1958; Pratt, 1942, Ohaver, 1933; Smith, 1943; Cox, 1947; Griffith, 1949; Gaines, 1956; Luhn, 1958) to describe the statistical characteristics of English words was examined to show the extent of their agreement. In addition, a detailed empirical study was made of two special types of English word: subject words and proper names. The data for the subject words and proper names was compared with previously reported data on subject

words, proper names, and continuous text material. The statistical parameters which were measured and compared are: the distribution of initial letters, the distribution of terminal letters, the composite or total distribution of letters, the distribution of characters for each letter position, the distribution of bigrams, and the distribution of word lengths. (Author)

PB-166 530 Div. 32
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
THE BEGINNINGS OF AUTOMATION OF TECHNICAL DRAFTING, WRITING, AND EDITING FUNCTIONS,
by Charles P. Bourne. 14 Apr 61, 20p
Unclassified report

Presented at the Annual Convention of the Society of Technical Writers and Publishers (8th), San Francisco, Calif., 13-14 Apr 61, as part of a panel discussion on Automation of Information Production and Retrieval: Its Effects and Requirements upon Editors and Publishers.

Descriptors: (*Documentation, Automation), (*Reports, Preparation), Information retrieval, Automatic indexing, Abstracting, Data processing systems, Data storage systems.

The paper concentrates on the facets of the documentation problem concerned with the drafting, writing, and editing of scientific and technical material. It is primarily concerned with mechanization of the production of useable information.

PB-166 532 Div. 32, 30
OTS Prices: HC $6.00/MF $1.50

TRW Computers Co., Canoga Park, Calif.
STUDY FOR AUTOMATIC ABSTRACTING.
Final technical rept.
1 Sep 61, 293p C107-1U12
Contract AF30 602 2223
RADC TR61 230
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Abstracting, Automatic), (*Documentation, Effectiveness), Correlation techniques, Analysis, Reliability, Punched cards, Language, Computers, Data processing systems.

The purpose of the work is to develop techniques for the automatic abstracting of textual information. An analysis was made of abstracts produced by human selection of sentences. The feasibility of machine abstracting was then investigated.

PB-166 533 Div. 32, 30
OTS Prices: HC $6.00/MF $1.25

TRW Computers Co., Canoga Park, Calif.
STUDY FOR AUTOMATIC ABSTRACTING,
APPENDIX D.
Final rept.
1 Sep 61, 222p C107-1U12, app. d
Contract AF30 602 2233
RADC TR61 230, app. d
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy. See also PB-166 532.

Descriptors: (*Abstracting, Automatic), (*Documentation, Effectiveness), Analysis, Reports, Language, Computers, Data processing systems.

PB-166 534 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Brussels Free Univ. (Belgium).
DISCUSSIONS SUR L'HYPOTHESE DE PROJECTIVITE. LE RELACHEMENT CONDITIONNEL DE L'HYPOTHESE DE PROJECTIVITE,
by Lydia Hirschberg. 25 Sep 61, 22p
Contract 018 61 5Cet B
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Machine translation, Language), (*Language, Theory), Belgium.

PB-166 536 Div. 32, 16
OTS Prices: HC $1.00/MF $0.50

Edinburgh Univ. (Scotland).
SYLLABLES AND STRESS,
by Peter Ladefoged, M. H. Draper, and D. Whitteridge.
1958, 15p
Unclassified report

Pub. in Miscellanea Phonetica III, 1958.

Descriptors: (*Speech, Physiology), (*Respiration, Speech), Vocabulary, Speech representation, Muscles, Sound, Stimulation, Language.

Stressed syllables are often discussed in phonetic literature. But in these discussions there is often little attempt to explain what is meant by stress, either in acoustic terms, or in terms of the activity of the speaker. It is simply assumed that the stress of an utterance is something which can be perceived. Similarly the syllable is often regarded as a unit which can be apprehended, but is not easy to define. In this article results are reported of a preliminary instrumental investigation into the connection between these perceived features of speech and the action of the speaker's breathing mechanism.

PB-166 538 Div. 32
OTS Prices: HC $1.00/MF $0.50

Washington Univ., Seattle.
MT LINGUISTICS AND MT LEXICOGRAPHY,
by Erwin Reifler. 12 Sep 59, 16p
Unclassified report

Prepared for the International Conference for Standards on a Common Language for Machine Searching and Translation in Cleveland, Ohio, 6-12 Sep 59.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Languages, Machine translation), (*Machine translation, Languages), Vocabulary, Standards.

Linguistic and lexicographical research on the

standardization of a common language for machine searching and translation are presented. Emphasis is placed on the best possible representation in one or more languages of meaning expressed in another language.

PB-166 539 Div. 32, 4
OTS Prices: HC $1.00/MF $0.50

Center for Documentation and Communication Research, Western Reserve Univ., Cleveland, Ohio.
THEORY OF DOCUMENTATION AND STRATEGY OF SEARCHING. CONVERSION OF SUBJECT INDEXES OF CHEMICAL ABSTRACTS FOR MACHINE SEARCHING. PART I, SOME PROBLEMS IN CONNECTION WITH THE TRANSFER OF INDEX ENTRIES TO MAGNETIC TAPE.
Rept. for 12-13 April 60,
by Jessica S. Melton. 13 Apr 60, 19p
Contract AF49 638 357

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Information retrieval, Automatic), (*Subject indexing, Chemistry), Documentation, Search theory, Periodicals, Indexes, Magnetic tape.

PB-166 542 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Center for Documentation and Communication Research, Western Reserve Univ., Cleveland, Ohio.
THEORY OF DOCUMENTATION AND STRATEGY OF SEARCHING. RELIABILITY DISTRIBUTIONS OF DOCUMENTATION SYSTEMS.
Rept. for 12-13 Apr 60,
by Harrison M. Wadsworth and Robert E. Booth.
13 Apr 60, 40p
Contract AF49 638 357

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Documentation, Reliability), (*Information retrieval, Search theory), Probability, Errors, Costs, Statistical analysis, Systems engineering, Operations research.

An analysis of the reliability of a documentation system concerns the probability that all of the operations of the system will function in a prescribed manner.

PB-166 543 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Center for Documentation and Communication Research, Western Reserve Univ., Cleveland, Ohio.
THEORY OF DOCUMENTATION AND STRATEGY OF SEARCHING. RESEARCH STRATEGY IN DOCUMENTATION.
Rept. for 12-13 Apr 60,
by James W. Perry. 13 Apr 60, 42p
Contract AF49 638 357

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Documentation, Operations research), Subject indexing, Search theory, Mathematical analysis, Scientific research, Automation, Information retrieval.

Topics include: the question of basic postulates; the application of mathematical concepts; formulations of basic or fundamental nature; mathematical formulations at the applied level; formulation of unit operations; formulating areas for future research and development; introducing automation into fields more or less related to library science.

PB-166 544 Div. 32
OTS Prices: HC $1.00/MF $0.50

Institut International des Brevets, The Hague (Netherlands).
MECHANICAL SELECTION ON THE BASIS OF CONCEPTS AND THEIR RELATIONSHIPS,
by G. J. Koelewijn. Sep 59, 10p
TT 65 60465

Unclassified report

Trans. of Nachrichten fur Dokumentation (West Germany) 1961, v. 12, beiheft, p. 208-216 (AIDA Proceedings).

Descriptors: (*Information retrieval, Automatic), (*Patents, Information retrieval), Documentation, Subject indexing, Carburetors, Netherlands, West Germany.

The object of the research was to gain experience of mechanical searching in fields for which it was not prima facie obvious in what way mechanical searching could offer a solution to the problems. A research was made in the field of the patent literature relating to carburetors.

PB-166 545 Div. 32, 30
OTS Prices: HC $3.00/MF $0.75

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
WORD CORRELATION AND AUTOMATIC INDEXING.
Progress rept. no. 2.
21 Dec 59, 59p C82-0U1

Unclassified report

Submitted to the Council on Library Resources, Washington, D. C.

Descriptors: (*Subject indexing, Automatic), (*Information retrieval, Effectiveness), Language, Statistical analysis, Punched cards, Nuclear physics, Word association, Libraries, Correlation techniques, Simulation, Search theory, Mathematical analysis, Indexes, Computers.

PB-166 546 Div. 32, 30
OTS Prices: HC $3.00/MF $0.75

Thompson Ramo Wooldridge, Inc.,
Canoga Park, Calif.
WORD CORRELATION AND AUTOMATIC INDEXING. AN EXPERIMENT IN AUTOMATIC TEXT SEARCHING.
Final rept. phase 1,
30 Apr 60, 56p C82-0U4

Unclassified report

Submitted to the Council on Library Resources, Washington, D. C.

Descriptors: (*Information retrieval, Effectiveness), (*Subject indexing, Automatic), (*Language, Information retrieval), Word association, Indexes, Search theory,

Programming (Computers), Data processing systems, Magnetic tape, Dictionaries, Computers, Libraries, Simulation, Correlation techniques.

The paper describes an experimental approach to the development of techniques for automatic indexing, and reports the results of an initial set of experiments based on that approach. The experiments reported are intended to measure the effectiveness with which information responsive to specific questions can be recognized through machine search of natural language text. A 'model' information system consisting of a small collection of physics articles and a set of ad hoc questions was created. The questions were transformed into search instructions using a thesaurus-type glossary as an aid, and the text of the articles (recorded digitally on magnetic tape), then searched by a general purpose computer. The responding documents were compared with those determined to be responsive through direct examination of the entire collection of articles. A comparison was also made with the results of searching a human-created subject heading index of the model library. Varying degrees of success in retrieval were encountered. On the whole, retrieval effectiveness was rather poor, yet machine search of the text of the model library was significantly better than was human searching of the subject heading index. (Author)

PB-166 547 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

IBM Research Center, Yorktown Heights, N. Y.
LITERATURE ON INFORMATION RETRIEVAL AND MACHINE TRANSLATION. THE AUTOMATIC INDEXING OF BIBLIOGRAPHIES BY MEANS OF A KEY WORDS-IN-CONTEXT SYSTEM.
Bibliography and Auto-Index ed. no. 2,
ed. by Peter James. Jun 59, 42p
Unclassified report

Descriptors: (*Subfect indexing, Automatic), (*Bibliographies, Subject indexing), (*Information retrieval, Subject indexing), (*Machine translation, Bibliographies), Documentation, Word association, Dictionaries, Language, Punched cards.

The system used in the bibliography was developed to facilitate the discovery of titles in a given subject area by means of a novel word index. The index consists of an alphabetic list of significant words, or key words occurring in the titles. Each of these key words is given in context, i.e., several words preceding and several words succeeding each key word are given so that with their aid the relationship of the word to the meaning of a title may be revealed. The bibliographical compilation consists of two parts. Part One is a listing of items by author, including title, source and other bibliographical data. The items are idenfified by an index code. Part Two consists of an alphabetic listing of key words-in-context. Each entry consists of a single one of standard length. The key word is located in the middle of each line and the initial letters of all key words appear at identical locations in the lines. All key words are aligned vertically to form a column. Each line is identified by the index code which refers to the corresponding item in Part One. Author, title, and source information first was punched into IBM cards to create a master file of data in machine-readable form. The direct machine output is presented. By scanning adjacent words to likely key words in the index, the user will be led to appropriate titles and to other items in the index. The index code of each index item is keyed to a title in the bibliography.

PB-166 549 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Spiegelthal (Edwin S.) Flushing, N. Y.
REDUNDANCY EXPLOITATION IN THE COMPUTER SOLUTION OF DOUBLE-CROSTICS,
by Edwin S. Spiegelthal. Dec 60, 17p
Unclassified report

Rept. on Proceedings of the Eastern Joint Computer Conference, Dec 60.

Descriptors: (*Machine translation, Redundant components), Problem solving, Automatic, Programming (Computers).

PB-166 550 Div. 32
OTS Prices: HC $2.00/MF $0.50

Centre d'Etudes pour la Traduction Automatique, Saint Martin d'Heres (France).
PRESENTATION DE L'ANALYSE MORPHOLOGIQUE DU RUSSE,
by B. Vauquois and J. Veyrunes. Feb 62, 27p
G-100-C
Unclassified report

Document in French.

Descriptors: (*Language, USSR), France, Machine translation, Vocabulary.

PB-166 551 Div. 32
OTS Prices: HC $3.00/MF $0.75

Centre d'Etudes pour la Traduction Automatique, Saint Martin d'Heres (France).
LANGAGES ARTIFICIELS: SYSTEMES FORMELS ET TRADUCTION AUTOMATIQUE,
by B. Vauquois. 1962, 54p
Unclassified report

A course presented at Venice, Italy, 15-31 Jul 62.
Document in French.

Descriptors: (*Language, Machine translation), (*Machine translation, Language), France, Automation, Automatic, Programming languages, Speech, Vocabulary.

Contents:
From artificial languages to natural languages: models and methods of describing language
Syntax functions: construction of system model formulas
Construction of terms of the system model to separate words from language
Different aspects of morphological derivation: application to German, English, French, and Russian.

PB-166 552 Div. 32
OTS Prices: HC $2.00/MF $0.50

Centre d'Etudes pour la Traduction Automatique, Saint Martin d'Heres (France).
ETUDE MORPHOLOGIQUE DES CLASSES DE MOTS INVARIABLES ET DES PRONOMS DE LA LANGUE RUSSE.
Apr 62, 46p G-104-1
Unclassified report

Document in French.

Descriptors: (*Language, USSR), Vocabulary, France, Numbers, Machine translation.

Contents:
Study of cardinals numbers, by Dominique Andron
Study of pronouns, by Lydie Torre
Study of adverbs, by Dominique Andron

Study of prepositions, by Anita Gagny
Study of conjunctions, by Helene de Crousnilhon
Study of particles, by Anita Gagny

PB-166 553 Div. 32
OTS Prices: HC $2.00/MF $0.50

Centre d'Etudes pour la Traduction Automatique, Saint Martin d'Heres (France).
ETUDE MORPHOLOGIQUE DU JAPONAIS,
by Sae Yamada. Jun 62, 45p G-1000-2
Unclassified report

Document in French.

Descriptors: (*Language, Japan), Vocabulary, France, Machine translation.

PB-166 554 Div. 32
OTS Prices: HC $2.00/MF $0.50

Centre d'Etudes pour la Traduction Automatique, Saint Martin d'Heres (France).
ANALYSE MORPHOLOGIQUE DU VERBE RUSSE,
by Anita Gagny. Mar 62, 42p G-103-2
Unclassified report

Document in French.

Descriptors: (*Language, USSR), France, Machine translation, Vocabulary.

PB-166 555 Div. 32
OTS Prices: HC $2.00/MF $0.50

Centre d'Etudes pour la Traduction Automatique, Saint Martin d'Heres (France).
ANALYSE MORPHOLOGIQUE DU SUBSTANTIF RUSSE,
by D. Andron. Feb 62, 40p G-101-4
Unclassified report

Document in French.

Descriptors: (*Language, USSR), Vocabulary, Machine translation, France.

PB-166 556 Div. 32
OTS Prices: HC $2.00/MF $0.50

Centre d'Etudes pour la Traduction Automatique, Saint Martin d'Heres (France).
ANALYSE MORPHOLOGIQUE DE L'ADJECTIF RUSSE,
by Lydie Torre. Mar 62, 35p G-102-3
Unclassified report

Document in French.

Descriptors: (*Language, USSR), Vocabulary, France, Machine translation.

PB-166 559 Div. 32, 14, 17, 25
OTS Prices: HC $1.00/MF $0.50

Hughes Aircraft Co., Culver City, Calif.
AN INFORMATION RETRIEVAL PROGRAM ON THE ELECTRICAL AND ELECTRONIC PROPERTIES OF MATERIALS,
by H. Thayne Johnson. 1962, 17p Unclassified report

Presented at the Symposium on Materials Information, Dayton, Ohio, November 28-29, 1962.

Descriptors: (*Information retrieval, Data processing systems), (*Materials, Information retrieval), Subject indexing, Abstracting, Vocabulary, Data storage systems, Experimental data, Electrical properties, Conductivity, Electromagnetic properties, Magnetic properties, Optical properties, Radiation damage, Surface properties, Semiconductors, Electric insulation, Dielectrics, Metals, Ferrites, Ferromagnetic materials, Electroluminescence, Thermionic emission, Superconductors.

The program described was initialed in June 1961 to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluate and compile the experimental data from this literature. The program covers nine major categories of materials: semiconductors, insulators, ceramics, ferroelectric dielectrics, metals, ferrites, ferromagnetics, electroluminescent materials, thermionic emitters and superconductors.

PB-166 560 Div. 32
OTS Prices: HC $2.00/MF $0.50

Indiana Univ., Bloomington. Linguistics Research Proj.
ADJECTIVES BEFORE THAT-CLAUSES IN ENGLISH,
by D. Alexander and P. H. Matthews. Sep 64, 33p
Grant NSF GS108
Unclassified report

Descriptors: (*Language, Classification), (*Classification, Language), Catalogs, Vocabulary.

Adjectives before that-clauses may be cross-classified by two main criteria. These are as follows:
(i) Occurrence in the formula It + Copula + ADJECTIVE + that + Sentence as against occurrence in the formula Personal Noun-phrase + Copula + ADJECTIVE + that + Sentence; e.g. 'It is OBVIOUS that he will come' as against 'John is SURE that he will come' (but neither '*John is OBVIOUS that'.... nor '*It is SURE that' ....).
(ii) Non-deverbal as opposed to deverbal status; e.g. there are no verbs to which OBVIOUS and SURE may be related, but FRIGHTENING (It's FRIGHTENING that he should have done such a thing) and HORRIFIED (I was HORRIFIED that it happened so quickly) may be related to FRIGHTEN and HORRIFY. Within this framework a number of secondary criteria can be taken into account.

PB-166 561 Div. 32
OTS Prices: HC $3.00/MF $0.75

Indiana Univ., Bloomington. Linguistics Research Proj.
SOME CLASSES OF VERBS IN ENGLISH,
by D. Alexander and W. J. Kunz. Jun 64, 89p
Grant NSF GS108
Unclassified report

Descriptors: (*Language, Classification), (*Classification, Language), Catalogs, Vocabulary.

The following lists are not themselves intended either as a segment of a lexicon for English, or as a partial description of some area of English syntax. It is hoped that they will be a useful guidance, or basis, for work in these and related fields of investigation. Each list approximates to the list of all simple verbs in English which might (in the investigators' judgment) satisfy the formula and accompanying criteria set out in the description which precedes it.

PB-166 568 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
WORD CORRELATION STUDY III,
by R. P. Mitchell. 1959, 10p
Contract AF30 602 1889
RADC TN59 58; AD 210 727
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also PB-166 570.

Descriptors: (*Vocabulary, Correlation techniques), Word association, Indexes, Algebra, Language.

A promising description of the syntax of a recursively defined sublanguage of English was described previously (PB-166 569). This line of research was pursued with special emphasis on (a) automatic reduction of strings, (b) lexical definitions, and (c) compilation of a basic vocabulary. (Author)

PB-166 569 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
WORK CORRELATION STUDY II,
by R. P. Mitchell. 1959, 15p
Contract AF30 602 1889
RADC TN59 102; AD 212 425
Unclassified report

See also PB-166 568.

Descriptors: (*Vocabulary, Correlation techniques), Word association, Indexes, Algebra, Language.

A more comprehensive analysis of structure was made within the (suitably restricted) English language, setting aside the lexical problems. The restrictions imposed upon the English language are the same as previously (PB-166 570) viz., the class of sentences analyzable by the method described therein.

PB-166 570 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
WORD CORRELATION STUDY.
Final technical rept.,
by R. P. Mitchell. Sep 59, 19p LMSC-311696
Contract AF30 602 1889
RADC TR59 177; AD 230 408
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also PB-166 568 and PB-166 569.

Descriptors: (*Vocabulary, Correlation techniques), Analysis, Word association, Indexes, Algebra, Computer storage devices, Language.

A proposal was made for studying word correlation in a sublanguage of English, and a method was presented by which correlations could be computed for the given sublanguage. The method of syntactic analysis conceived first by Y. Bar-Hillel ('Quasi-arithmetical notation for syntactic description. Language, p. 47-58, 1953) and studied by J. Lambek ('The mathematics of sentence structure. American Monthly, p. 154-170, March 1958) was arbitrarily extended to a larger part of the language than intended by these authors. This extension, termed by 'macrosyntax' because it provides a basis for classification of lexical units into function-sets, may not be justified on logical grounds. A refinement of syntactic analysis, called 'microsyntax,' was derived. The chief advance consisted in the abstraction of syntactic forms from semantic and/or functional interpretations given them in the macrosyntax, and opening the way to mathematical characterizations of syntactic forms and their construction. Microsyntactic indexing was also introduced, providing a means for very fine semantic distinctions between words whenever such interpretations are desired by the analyst. A list of basic English words was abstracted from West ('A general service list of English words. N. Y., Longmans, Green, 1957), their syntactic forms listed, and frequencies of occurrence per million computed from data given by West.

PB-166 585 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Bureau of Social Science Research, Inc., Washington, D. C.
PROFESSIONAL SCIENTIFIC SOCIETIES: THEIR MEMBERSHIPS, DUES AND ACTIVITIES,
by Grace S. Malakoff and Judith D. Klein.
Jun 64, 37p
Unclassified report

Descriptors: (*Scientific organizations, United States), Scientific personnel, Budgets.

This is a report of a survey of the membership, budgets, and activities of 188 scientific associations in the United States. The first such survey appeared in 1960 (National Science Foundation. 'Dues and membership in scientific societies', Sept. 1960. NSF - 60 - 55). Pertinent information from the previous report is included for historical perspective. Since the group of societies surveyed in this study is not identical with that included in the earlier report, direct comparisons, especially of numerical indices, cannot be made. During the intervening years new organizations have come into existence and some older ones have merged; and certain societies failed to report their activities in one or both surveys.

PB-166 586 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Zator Co., Cambridge, Mass.
INFORMATION RETRIEVAL SELECTION STUDY.
PART II: SEVEN SYSTEM MODELS,
by Calvin N. Mooers. Aug 59, 44p ZTB-133, pt. 2
Contract AF30 602 1900
RADC TR59 173; AD 230 290
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-230 278.

Descriptors: (*Information retrieval, Systems engineering), (*Data processing systems, Information retrieval), (*Documentation, Automation), Models (Simulations), Input-output devices, Bionics, Communication theory.

The problem of fitting information retrieval systems to the needs of the users of the systems is examined and a variety of information handling situations involving retrieval-like functions is considered. The paper points out that the current tendency is to take the well-known scientific laboratory type retrieval system as the only

model on which designs for larger or more complex systems are based. This paper contends that such a course is erroneous, and that new system models are needed to serve new functions. This argument is illustrated by descriptions of six new system models, in addition to the old model. The models are: (1) the laboratory scientific information retrieval model; (2) a system model for high output performance for many users; (3) a system model for high performance on the input side; (4) a system model involving cooperative input; (5) a routing model in which documents provide the 'questions' and a person is the retrieval 'answer;' (6) a model for storage of facts alone; and (7) a model with the machine in the role of a teacher. Finally, it is stated that the use made of a retrieval system depends not only upon the excellence of the system, but also upon the rewards provided for the people who use it. Conversely, if people are in effect punished for having or using information, then they will tend not to use a retrieval system. How this can happen is described. (Author)

33. Transportation

PB-166 577 Div. 33
OTS Prices: HC $3.00/MF $0.75

Operations Research, Inc., Silver Spring, Md.
A FUNCTIONAL ANALYSIS OF THE OCEAN PORT.
by T. Arthur Smith. 25 Aug 64, 59p ORI-TR-273
Contract MA3533

Unclassified report

See also AD-166 578.

Descriptors: (*Harbors, Operations research), (*Transportation, Operations research), Traffic, Shipping (Marine), Cargo, Cargo ships, Roads, Ships (Commercial), Water traffic, Analysis.

The basic function of all ports is to provide facilities for the two-way exchange of traffic between inland and oceangoing transport. In this study the port is subjected to analysis and a port system defined in terms of port operations, i.e., harbor, terminal, and distribution functions; supported by specialized and general administration functions. Port development is analyzed and the relationships between planning, research, financing, property acquisition, facility construction, and information exchange are shown. The metropolitan transportation function is considered, major problems are discussed, and their impact on port development is indicated. (Author)

PB-166 578 Div. 33
OTS Prices: HC $3.00/MF $0.75

Operations Research, Inc., Silver Spring, Md.
FEDERAL POLICY FOR UNITED STATES PORTS,
by James P. Morris and Robert F. Steeves. 25 Aug 64, 63p ORI-TR-274
Contract MA3533

Unclassified report

See also AD-166 577.

Descriptors: (*Harbors, United States Government), (*United States Government, Harbors), (*Transportation, Operations research), Commerce, United States, Merchant vessels, Shipping (Marine), Ships (Commercial), Management planning.

The statements and directives of the U.S. Government bearing on U.S. ports are identified and areas of conflicting or absent jurisdiction are noted. Congressional legislation has been constant in objective, i.e., ...promoting, encouraging, and developing ports and transportation facilities..., but varying in thrust as the balance of economic power and national defense requirements have shiftend. In all, 24 Federal organizational units were found to have policy implementing and operational authority in the port function. Executive branch policy was found to be more cohesive than congressional policy, but to a large extent unimplemented. Significant responsibility has been vested in the military departments. Redundant authority was noted. Non-Federal activity, i.e., state, local, and private, was found to be less than both the Congress and the executive branch desire. Within the framework of existing policy, authority to conduct comprehensive and integrated port planning and development was noted. Coordinated activities by several Federal agencies would be required.

SUBJECT INDEX

Subject	Division
Abstracting	32
Acceleration	28
Acoustics	6
Adhesives	14
Aerodynamic characteristics	9
Aeronautics	1
Aerospace craft	1
Agriculture	32
Air force training	1
Alloys	26
Alpha counters	20
Alpha particle detectors	20
Americium	20
Amplifiers	8
Antenna configurations	8
Antennas	8
Antimetabolites	16
Arming devices	22
Arms control	32
Artificial intelligence	30
Atmosphere entry	4
	9
Battery separators	7
Beaches	13
Beta particles	20
Bibliographies	9
	14
	30
	32
Bionics	30
Bleaching agents	4
Blunt bodies	9
Bombing	22
Bread	29
Buildings	13
Carbides	10
Celestial mechanics	2
Cellulose	14
Centrifugal pumps	12
	20
Ceramic materials	14
Cereals	32
Character recognition	30
Cholesterol	16
Chromatographic analysis	30
Circuits	7
	8
Clamps	13
Classification	30
	32
Cleaning compounds	14
Clutches	26
Coatings	14
Cobalt	20
Coding	8
Colloids	20
Communicable diseases	16
Communication satellites (Active)	5
Computer storage devices	8
Computers	30
Concrete	14
Containers	14
Controlled atmospheres	13
Corrosion	30
Cotton textiles	14
Data processing systems	2
	32
Decision making	30
Depth indicators	22
Desalination	4
	13
Detection	6
Detectors	6
Detonators	22
Diaphragms	14
Dies	26
Digital computers	30
Disarmament	32
Discharge tubes	8
Discriminators	8
Disease vectors	16
Display systems	6
Distillation	4
Distilling plants	4
Ditching	1
Documentation	16
	32
Dynamic programming	30
Ejection seats	1
Electric connectors	7
	8
Electric detonators	22
Electric propulsion	27
Electric switches	22
Electroacoustic transducers	6
Electromagnetic pumps	7
Electromagnetic wave reflections	6
Electrometers	30
Electron beams	20
Electron tubes	8
Electronic switches	8
Electrophotography	24
Esters	4
Evaporators	4
Explosive forming	26
Fatty acid esters	14
Fire control systems	22
Fire extinguishers	13
Firing mechanisms (Ammunition)	22
Fission products	20
Flight control systems	7
	12
Flight instruments	1
Flight simulators	1
Flight testing	1
Fluid flow	9
	12
Food	32
Foreign policy	32
Frequency shift keyers	5
Fuel cells	7
Fuel systems	12
Fuel tanks	12
Galvanometers	30
Game theory	30
Gamma rays	20
Gates (Circuits)	30
Generators	7
Guided missile components	12
Guided missile launchers	12
Guided missiles	12
	15
Guided missiles (Underwater-to surface)	12
Gun components	22
Harbors	33
Hardening	26
Heat transfer	9
	25
Heating	30
Height finding	1
High-pressure valves	30
Hose couplings	13
Hydrodynamics	9
Hypersonic flow	9
Image orthicons	8
Image tubes	8
Impact fuzes	22
Information retrieval	30
	32
Inverter circuits	8
Inverters	8
Ion engines	27
Ion exchange	7
Isotope separation	20
Kitchen equipment	29
Laboratory furnaces	30
Laminar flow	13
Landing gear	12
Language	30
	32
Learning	28
Life rafts	12
Liquid metal pumps	7
	20
Liquid metals	26
Lubricants	14
Machine translation	30
	32
Magnetohydrodynamics	7
	20
Magnetrons	8
Mapping	2
Marine engineering	9
	31
Markers	1
Materials	32
Membranes	7
Mica	2
Microscopes	16
Molding	26
Motion	15
Neutron scattering	20
Nuclear engineering	20
Nuclear reactors	20
Nucleotides	16
Numbers	30
Optical phenomena	30
Oscillation	8
Packaging	26
Partial differential equations	15
Particle accelerator targets	14
Particle accelerators	20
Patents	1
	2
	3
	4
	5
	6
	7
	8
	10
	12
	13
	14
	16
	17
	20
	22
	26
	27
	28
	29
	30
	32
Pattern recognition	30
Photoelasticity	30
Photographic techniques	9
Photography	24
Piezoelectric gages	8
Pins (Mechanical)	8
Plasma medium	20
Plasma physics	30
Plasticizers	14
Platinum	20
Plutonium	4
	10
	20
Polonium compounds	20
Powder metals	20
Powders	13
Power supplies	7
	20
Pressure	9
Pressure vessels	12
Printed circuits	8
Programming (Computers)	25
	30
Programming languages	2
Projectiles	7
Protective clothing	28
Psychometrics	28
Pulse communication systems	8
Quality control	5
Radar	6
Radar antennas	6
Radar equipment	8
Radar receivers	6
Radar tracking	6
	8
Radiation hazards	20
Radiators	25
Radio waves	6
Radioactive waste	20
Radiofrequency filters	8
Rayon	14
Reactor cores	20
Reactor fuel cladding	20
Reactor fuel elements	20
Reactor fuel processing	10
	20
Reactor fuel rods	20
Reactor power density	20
Reactor system components	20
Reading machines	30
Recovery	12
Reentry vehicles	12
Refractory metal alloys	17
Relays	7
Release mechanisms	22
Reports	32
Respiration	32
Roller bearings	22
Rotary seals	26
Safety devices	7
Samplers	5
Sand	13
Scientific organizations	32
Sea water	4
	13
Seals (Stoppers)	14
Shaft couplings	26
Ship hulls	9
Ship plates	31
Ship structural components	31
Shock waves	8
	9
Shoran	22
Sintering	14
Solid rocket propellants	10
Solids	14
Solvent extraction	20
Space capsules	12
Space communication systems	5
Space propulsion	27
Space tools	29
Spacecraft	7
	12
Spark machining	30
Speech	32
Stainless steel	17
	20
Stars	2
Steroids	16
Strontium	10
Subject indexing	32
Subminiature electronic equipment	8
Surface properties	6
Suspension devices	12
Switching circuits	8
Tanks (Containers)	29
Target acquisition	6
Telescopes	6
Terrain	2
Test equipment	30
Textiles	14
	26
Thermal radiation	14
Thermionic converters	7
Termite	13
Thorium	4
Timing devices	12
Torpedo launchers	22
Transportation	33
Tungsten alloys	17
Tuning devices	8
Ultrasonic radiation	26
Underwater sound equipment	22
Underwater sound signals	6
United States Government	33

Subject	Division	Subject	Division	Subject	Division	Subject	Division
Uranium	20	Variable capacitors	8	Waveguides	8	Woolen textiles	14
Uranium compounds	10	Vegetable oils	4	Weapon systems	22	Word association	30
Valves	3	Vocabulary	32	Weightlessness	12	Yttrium	20
	7	Voltage regulators	7	Welding	26		
	10	Water-activated batteries	7				

PERSONAL AUTHOR INDEX

Author	Division
Alexander, D.	32
Amsler, B. E.	12
Ananthakrishnan, V.	13
Anderson, D. F.	22
Anderson, G. L.	8
Andron, D.	32
Ard, J. S.	14
Arthur, J. C. Jr.	14
Baker, W. R.	20
Barduhn, A. J.	13
Bartlett, C. B.	20
Bassett, J. D.	2
Beck, H. M.	8
Besse, N. C.	8
Begeman, R. H.	6
Bellman, R.	30
Benedict, G. E.	10
Begston, P. S.	8
Bernstein, A.	30
Birkhoff, G.	9
Blackburn, C. M.	12
Blau, N. F.	1
Bliss, R. W.	22
Böhm, H.	26
Bolles, E. E.	22
Booth, R. E.	32
Boswinkle, G.	29
Bourne, C. P.	32
Boyer, G. L.	6
Bracciaventi, J.	14
Bray, L. A.	10
	20
Brooks, F. C.	2
Buck, D. C.	8
Burbeck, D. W.	22
Burger, L. L.	20
Burke, J. E.	20
Burkhart, L. E.	26
Burris, L., Jr.	10
Butterworth, R.	22
Carr, W. F.	7
Cash, B. A.	26
Caywood, T. E.	9
Chambers, J. C.	4
Chevillon, M.	22
Clarke, R. H.	6
Clay, C. S. Jr.	6
Condit, R. I.	20
Cook, C. R.	17
Creveling, C. J.	30
Crocker, B. W.	26
Cross, G. B.	5
Curry, G. R.	8
Darland, W. G., Jr.	7
Dassoulas, J.	12
David, C. E.	8
DeBold, F.	14
De Huff, P. G.	20
de V:Roberts, M.	30
Dean, V. C.	26
Demint, R. J.	14
Deneen, R. J., Jr.	7
Dietrich, W.	30
Doering R. F.	20
Donahue, W. J.	22
Draper, M. H.	32
Drew, J. B.	8
Driver, P. C.	12
Dyson, J. P.	20
Edwards, C. M.	1
Ehlers, H. H.	30
Ellson, D. G.	8
Ertel, L.	30
Exner, W. L.	22
Fauth, W. L., Jr.	20
Feder, M. S.	1
Firth, D.	30
Fischer, P. F.	1
Fisher, E. A.	14
Fleming, J. F.	8
Ford, D. F.	32
Fowler, W. D.	20
Fox, R.	7
Frachtman, H. E.	2
Frady, W. E., Jr.	22
Frampton, V. L.	4
Friedman, C.	2
Gagny, A.	32
Galindo, V.	8
Geiger, F. O.	1
Gerlach, H. W. A.	8
Gerlach, R. K.	30
Gill, W. N.	13
Giovannetti, Jr., A.	30
Glanzer, M.	28
Glasfeld, R.	31
Goldwyn, A. J.	16
Gray, R. F.	28
Graziano, E. E.	9
Guthrie, J. D.	14
Hafstrom, W. R.	29
Halton, J. E.	13
Hanson, L. A.	4
Harding, J.	1
Hargrove, R. E.	32
Harty, H.	20
Hatch, L. P.	20
Haynes, R. L.	8
Hecker, K. J.	8
Heissenbuttel, F. H., III	7
Hendrix, C. E.	12
Hertz, M. R.	20
Hicks, C. W.	8
Hill, M. M.	30
Himmelright, R. M.	30
Hinkel, L. H.	29
Hirschberg, L.	32
Hogan, J. D.	22
Hoice, J. P.	8
Holden, E. R.	13
Holden, R. W.	3
Horan, J. J.	6
Horiuchi, I.	9
Horton, M. D.	10
Houle, O.	10
Hubler, V. A.	25
Huttenlocher, J.	28
Ikle, F. C.	32
James, P.	32
Jansen, G., Jr.	10
Janza, F. J.	8
Johnson, G. D.	6
Johnson, H. T.	30
	32
Johnson, J. A.	29
Johnson, R.	20
Jones, L. W.	8
Josephson, P. R.	26
Kanes, M.	1
Karush, R.	30
Kauffman, S. H.	3
Kaufman, H. R.	27
Keighley, G.	12
Kenny, C. R.	1
Kent, A.	16
Khym, J. X.	16
Klein, J. D.	32
Klein, O. C.	24
Koelewijn, G. J.	32
Koenig, N. H.	14
Kolesar, D. F.	30
Kongelbeck, S.	12
Koochembere, C. T.	1
Kotter, J. I.	26
Kowalyshyn, S.	22
Kuck, J. C.	4
Kumm, W. H.	8
Kunz, W. J.	32
Kyrias, G. M.	13
Ladefoged, P.	32
Lake, F. N.	17
Lamb, W. A.S.	20
Lanigan, J. P., Jr.	26
Lauderdale, D. M.	8
Lawroski, S.	10
Lawson, B. D.	12
Letsch, W. L.	8
Lochhead, J. L.	22
Long, L., Jr.	14
Mackay, D. B.	25
MacLellan, D. C.	5
Maget, H. J. R.	7
Maiolatesi, E.	16
Malakoff, G. S.	32
Mankowich, A.	14
Martens, C. H.	26
Martin, D. F.	30
Martin, E. C.	20
Martini, W. G.	8
Matthews, P. H.	32
Mazur, M.	30
McCaffrey, F.	6
McDonough F. E.	32
McKeown, C. J.	13
Mellon, J. Jr.	1
Melton, J. S.	16
Melton, J. S.	32
Meyer, K. A.	30
Miller, C. S.	2
Miller, D.	29
Mitchell, R. P.	32
Monday, W. C.	12
Monroe, Jr., H. A.	4
Mooers, C. N.	32
Moon, R. M., Jr.	20
Moore, L. C.	8
Morris, J. P.	33
Mulford, S. F.	4
Murphy, S. R.	7
Neill, R. R.	13
Neubert, W. E.	7
Newby, B. J.	20
Nitta, H.	30
Nunge, R. J.	13
O'Leary, J. O.	14
Olson, D. M.	26
Olson, L. O.	7
Pace, N. A.	2
Paige, B. E.	20
Palladino, N. J.	20
Park, J. K.	32
Pearlman, H.	4
Perl, M. L.	8
Perry, J. W.	32
Platt, A. M.	10
Plumpe, D. J.	8
Pons, W. A., Jr.	4
Port, W. S.	4
Radkowsky, A.	20
Radnofsky, M. I.	12
Raisty, L. B.	4
Reejhsinghani, N.S.	13
Regimbal, J. J.	20
Reifler, E.	32
Reilly, J. J.	20
Reithel, R. J.	22
Reitz, G.	30
Resnik, A. E.	6
Richardson, G. L.	10
Rosenberg, S. J.	17
Royston, Jr., T. P.	17
Rush, T. L.	8
Salaun, H. L., Jr.	26
Schneider, A.	10
Schultz, H. G.	31
Scott, W. E.	14
Seaborg, G. T.	20
Semenoff, R. H.	22
Sharbaugh, J. E.	20
Shell, H. R.	2
Sheppard, T. W.	12
Sherman, H.	5
Sherman, J.	20
Shewmake, G. A.	12
Shonka, F. R.	30
Sibul, O. J.	9
Simmons, P. L.	30
Simmons, R. F.	30
	32
Singer, J. R.	30
Sliney, H. E.	14
Smith, S.	30
Smith, T. A.	33
Spiegelthal, E. S.	32
Steeves, R. F.	33
Stefan, L. J.	17
Stern, D. M.	30
Stevenson, D. D.	12
Stone, R. R.	5
Stuckwisch, C. G.	16
Swanson, J. L.	10
Taylor, R. E.	22
Teager, H. M.	30
Tesar, V.	30
Thompson, F. T.	6
Thompson, S. G.	20
Thomson, W. T.	15
Tolciss, J.	29
Torre, L.	32
Toyoda, K. G.	20
Trinite, G. M., Jr.	6
Tucker, W. D.	20
Vauquois, B.	32
Vetter, M. J.	8
Veyrunes, J.	32
Vis, E.	14
Villers, R. W.	12
Wadsworth, H. M.	32
Wagner, L. H.	8
Waldron, P.	5
Walker, R. A.	26
Wallace, E. F.	26
Warren, A. P.	12
Webb, B. K.	32
White, E. A., Jr.	7
Whitfield, W. J.	13
Whitteridge, D.	32
Widrig, R. D.	20
Willard, J. E.	20
Williams, R. M.	8
Williams, T. R.	8
Wilms, H. J., Jr.	8
Wood, K. E.	7
Wood, R. W.	8
Worlton, D. C.	26
Wyllys, R. E.	32
Yamada, S.	32
Yonkers, M. C.	4
Young, E. L.	7
Zarkowski, W. J., Jr.	1

CORPORATE SOURCE INDEX

Source	Division
Air Force Aerospace Research Pilot School, Edwards AFB, Calif.	1
Allis-Chambers Mfg. Co., Milwaukee, Wis.	7
American Zinc, Lead and Smelting Co., St. Louis, Mo.	24
Argonne National Lab., Lemont, Ill.	20
Brussels Free Univ. (Belgium)	32
Bunker-Ramo Corp., Canoga Park, Calif.	30
Bureau of Social Science Research, Inc., Washington, D. C.	32
Burroughs Corp., Paoli, Pa.	30
California Univ., Los Angeles.	4
Center for Documentation and Communication Research, Western Reserve Univ., Cleveland, Ohio	16, 32
Centre d'Etudes pour la Traduction Automatique, Saint Martin d'Heres (France)	32
Commissioner of Patents Washington, D. C. 20231	1 2 3 4 5 6 7 8 10 12 13 14 16 17 20 22 26 27 28 29 30 32
Dow Chemical Co., Denver, Colo.	14
Du Pont de Nemours (E. I.) and Co., Inc., Savannah River Lab., Aiken, S. C.	20
Edinburgh Univ. (Scotland)	32
Electronics Research Lab., Univ. of California, Berkeley	6 8 30
Electronics Research Labs., Columbia Univ., New York.	9
Ferguson (H. K.) Co., New York	4
General Electric Co., West Lynn, Mass.	7
Hanford Atomic Products Operation, Richland, Wash.	30
Harvard Univ., Cambridge, Mass.	9
Hughes Aircraft Co., Culver City, Calif.	30 32
IBM Research Center, Yorktown Heights, N. Y.	32
Indiana Univ., Bloomington. Linguistics Research Proj.	32
Institut International des Brevets, The Hague (Netherlands)	32
Institute of Engineering Research, Univ. of California, Berkeley	9 31
Kansas State Univ., Manhattan.	29
Lawrence Radiation Lab., Univ., of California, Berkeley	14
Lincoln Lab., Mass. Inst. of Tech., Lexington	2 4 5 8 20 30
Lockheed Missiles and Space Co., Sunnyvale, Calif.	9 32
Maryland Univ., College Park	28
Mason - Rust Louisville, Ky.	4
Massachusetts Inst. of Tech., Cambridge	30
Nachrichten fur Dokumentation (West Germany)	32
National Bureau of Standards, Washington, D. C. Inst. for Applied Technology	14
National Cash Register Co., Hawthorne, Calif.	30
Naval Applied Science Lab., Brooklyn, N. Y.	14
Naval Civil Engineering Lab., Port Hueneme, Calif.	13
Naval Radiological Defense Lab., San Francisco, Calif.	20
New Mexico Univ., Albuquerque	8
North American Aviation, Inc., Downey, Calif.	25
Oak Ridge Inst. of Nuclear Studies, Inc., Tenn.	30
Oak Ridge National Lab. Tenn.	7 20 30
Operations Research, Inc., Silver Spring, Md.	33
RAND Corp., Santa Monica, Calif.	30 32
Redstone Scientific Information Center, Redstone, Arsenal, Ala.	26 30
Sandie Corp., Albuquerque, N. Mex.	30
Spiegelthal (Edwin S.) Flushing, N. Y.	32
Standard Elektrik Lorenz, A. G. (West Germany)	30
Stanford Research Inst., Menlo Park, Calif.	32
Stearns-Roger Mfg. Co., Denver, Colo.	4
Syracuse Univ., N. Y. Research Inst.	13
Systems Development Corp., Santa Monica, Calif.	30 32
Technical Operations, Inc., Burlington, Mass.	2
Thompson Ramo Wooldridge, Inc., Cleveland, Ohio	17
Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.	32
TRW Computers Co., Canoga Park, Calif.	32
TRW Space Technology Labs., Los Angeles, Calif.	15
Union Carbide Nuclear Co., Oak Ridge, Tenn.	20
Washington Univ., Seattle	32
Zator Co., Cambridge, Mass.	32

CONTRACT NUMBER INDEX

Contract	Division	Number
14 01 001 218	4	PB-166 566
14 01 001 225	4	PB-166 564
14 01 0001 261	13	PB-166 573
14 01 0001 280	4	PB-166 565
018 61 5Cet B	32	PB-166 534
AF19 628 500	2s	AD-449 739
	4s	AD-449 857
	5s	AD-449 485
	8	AD-448 350
	20	AD-413 566
	30	AD-402 938
AF29 601 6002	8	AD-425-990
AF30 602 1889	32	PB-166 568
	32	PB-166 569
	32	PB-166 570
AF30 602 1897	9	PB-166 571
AF30 602 1900	32	PB-166 586
AF30 602 2233	32	PB-166 532
	32	PB-166 533
AF33 657 8953	25	AD-423 677
AF33 657 11239	17	AD-451 039
AF49 638 357	32	PB-166 539
	32	PB-166 542
	32	PB-166 543
AF49 638 700	30	AD-429 915
DA19 129qm1119	29	PB-166 576
DA36 039AMC00095E	7	AD-400 919
DA44 009eng3503	2	PB-166 572
DA44 009eng5100	24	AD-401 863
DA49 007MD1004	28	PB-166 537
MA2620	9	PB-166 579
	31	PB-166 580
	31	PB-166 581
MA3533	33	PB-166 577
	33	PB-166 578
NObs47750	7	AD-491 407
Nonr365611	6	AD-448 493
NOrd8555	9	PB-166 373
NOw63 0050c	9	AD-411 113
SD79	32	AD-277 214

Grant

AF AFOSR139 63	6	AD-448 493
	8	AD-445 821
AF AFOSR139 64	8	AD-445 821
NSF C233	30	PB-166 557
NSF GS108	32	PB-166 560
	32	PB-166 561
PHS E2913	16	PB-166 540
PHS HD00694	8	PB-166 583
PHS HE07683	12	PB-166 584

ACCESSION / REPORT NUMBER INDEX

Number	Division
AD-66 193	20
AD-207 125	9
AD-210 727	32
AD-212 425	32
AD-222 914	15
AD-230 290	32
AD-230 408	32
AD-232 782	29
AD-246 556	28
AD-247 661	9
AD-277 214	32
AD-400 919	7
AD-401 863	24
AD-402 938	30
AD-411 113	9
AD-413 566	20
AD-423 677	25
AD-425 990	8
AD-429 915	30
AD-440 100	26
AD-441 397	30
AD-443 699	1
AD-445 821	8
AD-448 350	8
AD-448 493	6
AD-449 485	5
AD-449 739	2
AD-449 857	4
AD-451 039	17
AD-491 407	7
AFOSR 64 1583	8
AFOSR 64 1906	6
ASD TDR63 222	25
B-199	30
C82-OU1	32
C82-OU4	32
C107-1U12	32
C107-1U12, app. d	32
CAPE-875	7
CAPE-918	30
CAPE-1066	20
CAPE-1095	20
CAPE-1113	14
CAPE-1122	30
CAPE-1128	30
CAPE-1131	20
CAPE-1135	30
CAPE-1146	20
CAPE-1148	20
CAPE-1151	14
CAPE-1154	20
CAPE-1189	20
DASA 1194	14
ERL-64-21	6
ERL-64-22	8
ESD TDR64 350	8
ESD TDR64 356	4
ESD TDR64 380	2
ESD TDR64 559	5
FN-6089	32
FTC-TIH-64-2004	1
G-100-C	32
G-101-4	32
G-102-3	32
T-103-2	32
G-104-1	32
G-1000-2	32
HAC-SRS-491	30
LL-1964-47	2
LL-1964-55	5
LL-TR-303	30
LL-TR-312	20
LL-TR-361	4
LMSC-8-40-62-7	9
LMSC-311696	32
ML TDR64 271	17
N63-18212	9
N64-13308	8
N64-22614	30
N64-22724	30
NA-64-5	9
NA-64-9	31
NA-64-10	31
NASL 5046 3 P124	14
NAVEXOS P1278	30
NAVWEPS 447	9
NCEL M011	13
ORI-TR-273	33
ORI-TR-274	33
OSW PR122	4
OSW PR123	4
OSW PR129	13
OSW PR132	4
OSW PR133	4
OTR-107	14
Patent 199, 592	29
Patent 3, 153, 825	26
Patent 3, 153, 850	26
Patent 3, 153, 979	12
Patent 3, 153, 980	12
Patent 3, 154, 040	7
Patent 3, 154, 093	12
Patent 3, 154, 265	12
Patent 3, 154, 266	12
Patent 3, 154, 285	10
Patent 3, 154, 373	14
Patent 3, 154, 375	4
Patent 3, 154, 376	20
Patent 3, 154, 378	10
Patent 3, 154, 379	10
Patent 3, 154, 381	2
Patent 3, 154, 471	20
Patent 3, 154, 497	14
Patent 3, 154, 500	10
Patent 3, 154, 501	20
Patent 3, 154, 687	8
Patent 3, 154, 713	8
Patent 3, 154, 745	6
Patent 3, 154, 750	8
Patent 3, 154, 779	1
Patent 3, 154, 780	22
Patent 3, 154, 781	6
Patent 3, 155, 992	12
Patent 3, 156, 011	26
Patent 3, 156, 039	26
Patent 3, 156, 079	32
Patent 3, 156, 090	27
Patent 3, 156, 153	22
Patent 3, 156, 208	22
Patent 3, 156, 433	7
Patent 3, 156, 522	14
Patent 3, 156, 523	20
Patent 3, 156, 526	20
Patent 3, 156, 532	20
Patent 3, 156, 534	26
Patent 3, 156, 558	17
Patent 3, 156, 568	32
Patent 3, 156, 588	7
Patent 3, 156, 594	10
Patent 3, 156, 622	30
Patent 3, 156, 623	20
Patent 3, 156, 625	20
Patent 3, 156, 747	20
Patent 3, 156, 768	8
Patent 3, 156, 846	8
Patent 3, 156, 851	12
Patent 3, 156, 869	30
Patent 3, 156, 873	8
Patent 3, 156, 904	8
Patent 3, 156, 979	29
Patent 3, 157, 054	26
Patent 3, 157, 451	8
Patent 3, 157, 460	14
Patent 3, 157, 463	20
Patent 3, 157, 529	14
Patent 3, 157, 637	16
Patent 3, 157, 676	14
Patent 3, 157, 718	14
Patent 3, 157, 802	7
Patent 3, 157, 829	8
Patent 3, 157, 834	8
Patent 3, 157, 847	8
Patent 3, 157, 859	8
Patent 3, 157, 890	1
Patent 3, 157, 931	13
Patent 3, 157, 932	13
Patent 3, 158, 018	1
Patent 3, 158, 030	26
Patent 3, 158, 031	13
Patent 3, 158, 060	22
Patent 3, 158, 063	22
Patent 3, 158, 098	22
Patent 3, 158, 124	22
Patent 3, 158, 149	28
Patent 3, 158, 172	30
Patent 3, 158, 244	26
Patent 3, 158, 334	26
Patent 3, 158, 336	12
Patent 3, 158, 344	1
Patent 3, 158, 351	3
Patent 3, 158, 418	8
Patent 3, 158, 420	7
Patent 3, 158, 457	13
Patent 3, 158, 468	4
Patent 3, 158, 493	14
Patent 3, 158, 543	20
Patent 3, 158, 549	20
Patent 3, 158, 577	20
Patent 3, 158, 578	4
Patent 3, 158, 614	20
Patent 3, 158, 626	16
Patent 3, 158, 633	4
Patent 3, 158, 672	6
Patent 3, 158, 676	6
Patent 3, 158, 705	22
Patent 3, 158, 753	30
Patent 3, 158, 762	6
Patent 3, 158, 774	8
Patent 3, 158, 780	8
Patent 3, 158, 791	7
Patent 3, 158, 795	7
Patent 3, 158, 810	5
Patent 3, 158, 815	8
Patent 3, 158, 817	8
Patent 3, 158, 818	8
Patent 3, 158, 825	8
Patent 3, 158, 830	6
Patent 3, 158, 831	6
Patent 3, 158, 845	8
Patent 3, 158, 859	6
Patent 3, 158, 860	6
Patent Design 199, 504	16
PB-166 337	14
PB-166 373	9
PB-166 400 see	
PB-166 573	13
PB-166 525	32
PB-166 526	32
PB-166 527	30
PB-166 528	32
PB-166 529	30
PB-166 530	32
PB-166 531	30
PB-166 532	32
PB-166 533	32
PB-166 534	32
PB-166 535	30
PB-166 536	32
PB-166 537	28
PB-166 538	32
PB-166 539	32
PB-166 540	16
PB-166 542	32
PB-166 543	32
PB-166 544	32
PB-166 545	32
PB-166 546	32
PB-166 547	32
PB-166 548	30
PB-166 549	32
PB-166 550	32
PB-166 551	32
PB-166 552	32
PB-166 553	32
PB-166 554	32
PB-166 555	32
PB-166 556	32
PB-166 557	30
PB-166 558	30
PB-166 559	32
PB-166 560	32
PB-166 561	32
PB-166 562	30
PB-166 563	30
PB-166 564	4
PB-166 565	4
PB-166 566	4
PB-166 567	4
PB-166 568	32
PB-166 569	32
PB-166 570	32
PB-166 571	9
PB-166 572	2
PB-166 573	13
PB-166 574	15
PB-166 575	20
PB-166 576	29
PB-166 577	33
PB-166 578	33
PB-166 579	9
PB-166 580	31
PB-166 581	31
PB-166 582	13
PB-166 583	8
PB-166 584	12
PB-166 585	32
PB-166 586	32
R-391-ARPA	32
RADC TN59 58	32
RADC TN59 102	32
RADC TR59 173	32
RADC TR59 177	32
RADC TR60 232	9
RADC TR61 230	32
RADC TR61 230, app. d	32
RM-3951-PR	30
RSIC 174	26
RSIC 186	30
RTD TDR63 3073	8
SB-62-61	9
SIC 19-11	22
SIC 19-29	6
	7
	12
	20
	22
SIC 19-99	10
	12
	22
	26
SIC 20-22	32
SIC 22-11	14
SIC 22-21	14
SIC 22-31	14
SIC 28-19	4
	10
	14
	20
	26
SIC 28-41	14
SIC 28-43	14
SIC 30-69	12
SIC 32-99	2
SIC 34-23	29
SIC 34-29	13
	29
SIC 34-33	13
SIC 34-43	4
	14
	20
	30
SIC 34-94	3
	10
	30
SIC 35-22	32
SIC 35-32	22
SIC 35-33	6
SIC 35-42	26
SIC 35-48	26
SIC 35-52	26
SIC 35-66	26
SIC 35-69	7
	20
SIC 35-71	8
	30
SIC 36-11	6
SIC 36-13	7
	22
SIC 36-21	7
SIC 36-29	7
SIC 36-43	7
	8
SIC 36-62	1
	5
	6
	8
	22
SIC 36-72	8
SIC 36-73	8

Number	Division
SIC 36-79	2
	7
	8
	30
SIC 36-92	7
	20
SIC 37-22	10
	12
SIC 37-29	1
	6
SIC 37-29	7
	12
	22
	28
SIC 37-31	22
SIC 37-32	12
SIC 38-11	5
	13
	16
SIC 38-21	1
SIC 38-21	6
	8
SIC 38-31	7
	8
	20
	30
SIC 38-41	20
SIC 38-42	28
SIC 39-99	13
STL-EM-9-15	15
STL/TR-59-000-00768	15
TM-486	30
TM-560	32
TO-B59-10	2
TT-65-60116	26
TT-65-60117	30
TT-65-60465	32
USNRDL AD95H	20
ZTB-133, pt. 2	32

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